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VIEWS, NEWS AND INTERVIEWS.

The Pennsylvania Railroad is equipping all its anthracite collieries with electric light plants and will cut coal 24 hours a day.

A monument to the memory of the late Cyrus W. Field and his wife is being made in Ireland, and will be placed in the historic burial ground at Stockbridge, Mass., where members of the Field family have been interred for generations. Mr. Field was buried side by side with his wife, and the monument is to be erected at the head of the two graves. Made of a huge block of gray Irish limestone, it will bear but little sculptured work. On one face of the stone will be carved a Latin cross in high relief. This symbol rests at the intersection of two palm branches, also in strong relief, placed crosswise.

A Scotch journal, in a recent issue, reports that not long since a gentleman, who was on a visit to the coast, while bathing, was seized with a cramp and sank, being two minutes below water. When rescued he was thought to be dead, but after two applications of the electric current, animation was restored. The current was passed between the nape of the neck and the heart.

The annual meeting for the election of the Board of Directors of the Gold and Stock Telegraph Company was held on September 27 by the stockholders, in the Western Union building, and with the exception of the election of Howard Gould, in place of Jay Gould, which was done at the father's request, the board remained the same as before. The ten present directors are: Norvin Green, Thomas T. Eckert, John Van Horn, Howard Gould, William M. Bliss, Russell Sage, Charles G. Landon, Charles A. Tinker, William A. Wheelock, George J. Gould.

It is said that there are 37,000 woman telegraphers in the United States.

A new switchboard has just been finished at the Thomson-Houston factory at Lynn, Mass., for the World's Fair. Is is compose of 20 slabs of white marble in four tiers, each tier being five slabs high. The three bottom tiers are for the plugs, the fourth for the ammeters and the fifth for the lightning arresters. There are 80 lightning arresters, 40 ammeters, 64,000 bushings for plugs and 8,280 rubber buttons. It is a 40 circuit board with 328 changes.

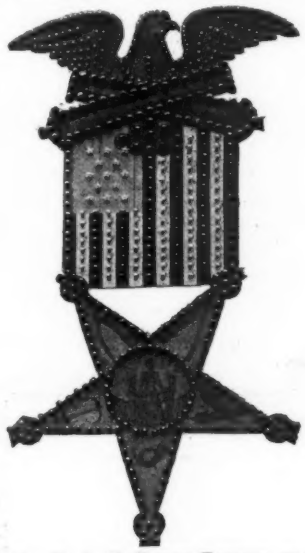


FIG. 1.—G. A. R. BADGE FORMED OF INCANDESCENT LAMPS.

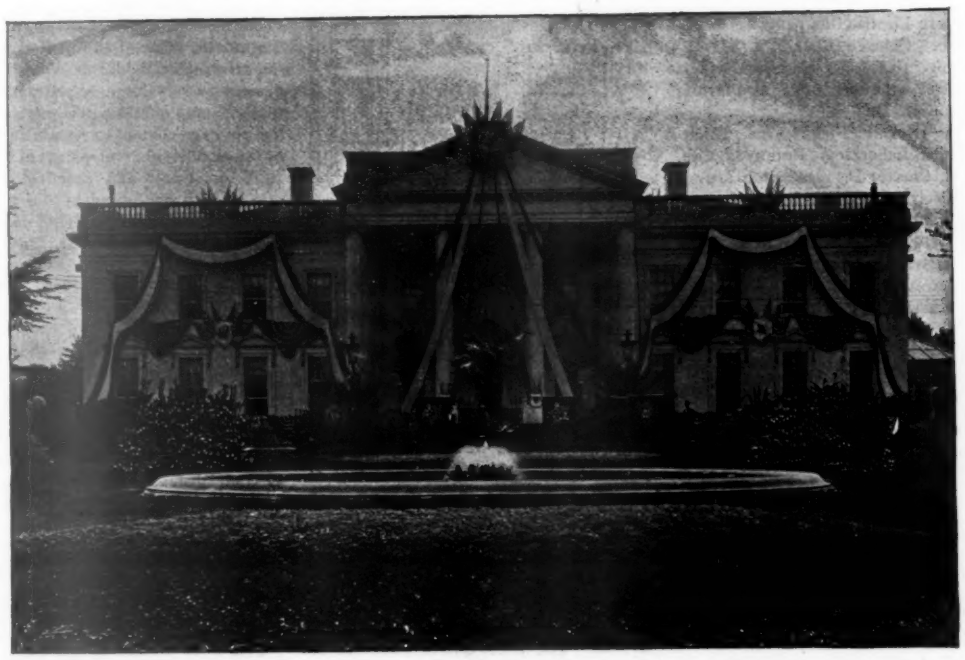


FIG. 2.—ELECTRICAL DECORATIONS OF THE WHITE HOUSE AND GROUNDS DURING THE G. A. R. MEETING AT WASHINGTON.

Electric Illumination at Washington.

That public fetes and celebrations without electricity to enhance their splendor and give to them the necessary *eclat* are becoming rarer, has been very adequately proved during the recent gathering of the veterans of the Grand Army at Washington. The celebration was to be so grand in the day light, that for it to have failed in the evening, when, parades over, the visitors were free to promenade Washington's magnificent thoroughfares, would have cast a serious reflection on the committee in charge. It was felt that electricity only would satisfactorily answer the purpose, and, therefore, it was adopted as the only means by which a thoroughly brilliant illumination could be obtained.

To the decorative lamp department of the General Electric Company, which distinguished itself at the Actor's Fund Fair last May, was confided the arduous task. The results were beyond compare the finest yet obtained and elicited admiration and approval from every one, either visitor or resident.

The interest in the reunion centered itself about Pennsylvania avenue, stretching from the White Capitol to the Treasury and the Executive Mansion, and it was determined that the electrical display should also be centered there.

Running from near the Pennsylvania Railroad Depot to the Treasury, pole lines were erected on both sides of the avenue. At short intervals along these two lines different corps badges were designed in small, but intensely brilliant incandescent lamps, each corps badge being repeated three times at various points on the avenue in the National colors of red, white and blue.

(*Continued on page 81.*)

LIGHT AND POWER STATIONS.

SOME HINTS TO OWNERS AND OPERATORS BY A PRACTICAL ENGINEER.

Mr. MacKie Concludes His Remarks on Station Design with Two Concrete Examples—Provide Facilities for Moving Heavy Machinery—Make Your Entrances Sufficiently Large.

BY ROBB MACKIE.

IX.

An entire volume could be written upon this one subject of the design of buildings for central stations for light and power, in which full details and descriptions would be given of the buildings and various machinery to be placed therein, but as the purpose of these papers is rather to draw the attention of station owners and operators to a few of the errors made in the past, with a view to set them thinking and cause them to study their own plants, with a view to the bettering of their condition, a few examples of poor station designs, and lack of appreciation on the part of those most interested, of the possibilities at hand, will make a fitting close to these remarks on station building.

A style of station, of which we find numerous examples in all parts of the country, is to have a boiler room just large enough for a single boiler and a supply of coal, if indeed, the boiler is not set down in one end of a building without being separated from the engines and dynamos. The engine is provided with two pulleys, from one of which is belted an arc light dynamo, usually used to operate the street lights, while from the other is belted an incandescent light dynamo used to supply current for the interior illumination. The engine and dynamos are usually placed so as to occupy the entire available floor space of the building, arranged to be sure, with ample passageways along each side and at the ends, which are generally cluttered up with odds and ends of supplies, cross-arms, etc., which are supposed to be "kept in the corner."

The building, usually of frame, corrugated iron or flimsy brick, too often has no other foundations than posts or piers under the sills in the frame structures, and a plant on the leveled off ground under the brick ones, while the engine is placed on a so-called "foundation" built up through the floor. As a rule, dynamos are "cleated down" on the floor without any special foundation, which as previously pointed out results in the jarring and shaking, which seriously damages the building and interferes with the proper working of the machinery.

In such an arrangement there is absolutely no chance to increase the machinery without turning out all in use, which can rarely be accomplished without shutting down the entire station.

The general plan of a station of this kind is shown in Fig. 1. Any one who is familiar with small stations around the country wil recognize the "type" at a glance.

By a small increase in the size of the

building, at a trifling additional cost, a station can be secured in which there is ample room in the boiler house for a second boiler when it is required; while by the use of an engine and countershafting, the belts running across the room instead of lengthwise of it, many advantages of operation are secured without adding materially to its width. The shafting at first will only be half the length of the room, which will leave ample space at the unoccupied end for a storeroom and office.

By exercising a little foresight at the outset in constructing the walls of the building, provision can be made at the end containing the offices for eventually erecting a second floor over that portion, which can be done in a sightly manner, to be occupied as offices when the time comes to increase the capacity of the plant. This can be done by extending the shafting and putting in a second engine to correspond with the first.

By having the first section of shafting installed by a reliable firm, it can be provided with split pulleys, which, at any time, can be removed and replaced with clutch pulleys, which will be found of great advantage in operating the plant, while if they are advised of the intention to eventually put in the second length of shafting, provision will be made to allow the placing of the necessary clutch couplings which will permit the operation of both sections from either one or both engines.

The additional first cost of the ground in this second case, a plan of one of the arrangements of which is shown in Fig. 2, will not amount to enough to give it second consideration, while by expending this small sum at the outset of the undertaking, provision is made for the doubling of the machinery when required at trifling cost for additional building.

Still a third plan, requiring, however, more ground space than the foregoing, is to make the boiler house large enough for three boilers, to be placed as needed, and at the outset to put in a larger engine and longer shafting than would be called for in Fig. 2. This would give accommodations for more dynamos when needed, calling, of course, for larger investment for the engine at the outset, but, by following the same arrangement of building for offices as shown in Fig. 2, the capacity of the plant could be very greatly increased when necessary.

At another point in these papers attention will again be called to these two plans for the purpose of pointing out the advantages to be gained in the operation of a station built upon the general outline of Fig. 2 over one of the style of Fig. 1.

With far greater force the features of superiority of Fig. 2 over Fig. 1 will be found to apply to stations of a larger size, and the text of which these two figures is the basis will be found one which will permit of much careful study on the part of those most deeply interested in this subject, the men who furnish the funds with which the work is paid for.

A too common error made in the general design of stations, which has caused an almost endless expense and unlimited wear and tear upon the minds and bodies of our central station men, is the absence of the proper facilities for moving the oftentimes heavy machinery in and out of the buildings. In too many cases this lack of facilities extends to a failure to provide the necessary doorways or openings at proper points for a convenient handling of machinery, while, astonishing as it may seem, in some it has been necessary to tear out a section of the wall of the building through which to pass the machinery in order to get it in place without shutting down the entire plant.

One station is particularly unfortunate in this particular, for it has been necessary to tear out large holes in the walls in order to get the engines in place, and again to jack two large machines ten feet into the air and then move them for 100 feet on skids, in the course of which they were handled over two lines of shafting, and then lower them into place. But the most unfortunate condition has lately transpired at this station, for buildings now so entirely surround it that when the next machinery has to go in the only way to get it in place without stopping the engines will be to let it down through the roof. An examination of this place indicates that the only apparent reason for this unfortunate condition was a disinclination on the part of the designer of the building to mar the beautifully balanced symmetry of the architectural design of the front of the structure.

These illustrations will serve to emphasize the point it is desired to make in this connection, to the effect that it is the easiest thing in the world to design a building for even the smallest electrical plant which is not in any particular suitable for the purpose, and that painstaking, careful study is required to produce one that will meet the exacting requirements of the situation.

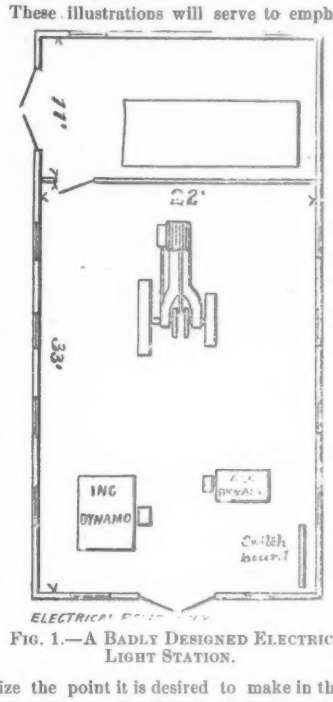


FIG. 1.—A BADLY DESIGNED ELECTRIC LIGHT STATION.

(To be continued.)

American Institute of Electrical Engineers.

At a meeting of the council of the institute, held on September 27, the following gentlemen were admitted to associate membership:

Albright, H. Fleetwood, electrical engineer, Western Electric Company, 227 South Clinton street, Chicago, Ill.

Armstrong, Chas. G., electrical expert and electrical architect, 1301 Auditorium Tower, Chicago, Ill.

Callender, Romaine, electrician, Brantford Electrical Laboratory, Brantford, Can.

Crandall, Chester D., assistant treasurer, Western Electric Company, 227 South Clinton street, Chicago, Ill.

Fisher, George E., general manager, Commercial Electric Company, 55 to 57 Gratiot avenue, Detroit, Mich.

Flesch, Charles, electrical engineer, Melbourne, Australia.

Jackson, J. P., assistant professor of electrical engineering, Penn State College, State College, Pa.

Kinsman, Frank E., electrical engineer, Plainfield, N. J.

Magenis, James P., editor the *Adams Freeman*, Adams, Mass.

MacFadden, Carl K., chief electric light inspector, Chicago and Northwestern Railway Company, 22 Fifth avenue, Chicago, Ill.

McBride, James, superintendent, New York and Boston Dye Wood Company, 146 Kent street, Brooklyn, N. Y.

Noel, Augustus, New York Insulated Wire Company, 15 Cortlandt street, New York city.

Ray, William D., electrician of local line of Northern Pacific Railroad Company, at Chicago, 308 Home avenue, Oak Park, Ill.

Rodgers, Howard S., electrical engineer, Thomson-Houston Electric Company, 624 Western avenue, Lynn, Mass.

Ross, Robert A., engineer in charge of engineering department Edison General Electric Company, Petersborough, Ont.

Smith, Frank Stuart, superintendent of carbon department Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.

Civil Service Examinations for Belgian Telephone Operators.

There is gloom and desolation among the hello girls in all the telephone offices throughout the kingdom of Belgium. They are greatly, and quite naturally, disturbed and oppressed by a Chinese civil service examination bogie which their new employer, the State, is shaking at them, says the New York *Sun*. The newspapers are trying to console them, and the Mugwump press is talking of the elevation of the public service, but the operation of the Chinese mill promises to be as unfair as it is ridiculous. All the telephones in Belgium were recently acquired by the government, but with the understanding that all the employés would be re-engaged after December 31 next, when their present contract expires. The operators are now informed that they will have to undergo an examination at the re-engagement, and a failure to pass means a loss of place. The girls naturally supposed the examination would simply be on matters concerned with the proper performance of the work required of them in the manipulation of the telephonic apparatus, and were not a bit afraid, being all well skilled in the work for which they were engaged and paid. But the official programme of the examinations recently arrived at the telephone offices and created consternation. A thousand things will be required from telephone operators under State control which were not considered at all necessary by private companies, which have operated the systems with perfect success. In addition to the two national languages, French and Flemish, a thorough knowledge of German and English will be obligatory on the hello girls. They must be well up in geography, and submit a complete drawing of the map of Europe. Many other conditions of similar nature are to be imposed. And with all this salaries are to be largely reduced, in some cases 33 per cent. While it is conceded that it would be advantageous to have one or two operators in the large central offices possessing a knowledge of the four languages, it is considered absurd and oppressive that all operators should be required to know them. It is stated by the *Independance Belge* that many women who have been connected with the telephone service for from 10 to 15 years will be compelled to seek other employment after December 31. Dozens of younger women will have to go, too, for it is impossible to learn German and English in three months and answer "hellos" all day, too. The paper quoted says that the ministry "is being heartily cursed," and that efforts are being made to have the examination requirements sensibly modified.

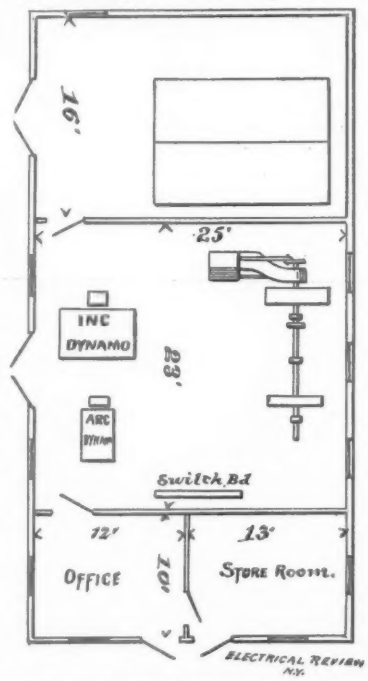


FIG. 2.—A WELL DESIGNED ELECTRIC LIGHT STATION.

The Boston Y. M. C. A.

Young men in Boston will have unusual facilities this year for educating themselves by taking advantage of the excellent educational courses provided by the Boston Y. M. C. A. A good course in electricity is one of the features.

ELECTRICAL PEOPLE WE MEET.

Mr. F. A. Pickernell, engineer to the American Telephone and Telegraph Company, New York, is one of the prominent figures in telephone affairs. Mr. Pickernell holds a degree of mechanical and electrical engineer from the Massachusetts Institute of Technology, where for some time after his graduation he was engaged as instructor. After leaving the institute Mr. Pickernell entered the laboratory of the American Bell Telephone Company at Boston, and from there entered the service of his present company as head of the technical staff. Mr. Pickernell has a mathematical ability of no mean order, and is one of the few men in his profession who can bring to bear on everyday problems a thorough academic training coupled with good practical ideas.

Mr. Ronald T. McDonald, of the Fort Wayne Electric Company, devoted last week to his New York office at 44 Broad street. There is probably not a more active man in the entire electrical industry than this wide awake and very successful Indianian. The appearance of the electric light found him ready, and he truly deserves the title of pioneer. His company has been very successful, has branch offices all over the country, and Mr. McDonald is reputed to be worth a round million. He is the owner of a valuable farm near Fort Wayne, Ind., and often announces that he intends to retire from his present active life to his country home, there to experience bucolic joys, follow the plow and milk the cow, and let the bother of electric light and power contracts slide. As an indication of this intention on the part of Mr. McDonald, his friends point to the fact that he has just invested a few hundred thousand in a big city electric railway. This doesn't look a great deal like retiring to the plow right away. Mr. McDonald is highly esteemed wherever known, is particularly strong in financial circles, occasionally takes a shy at politics on the Republican side of the fence, and is not really happy unless doing three men's work every day in the year.

Mr. Frederick Washington Royce is an electrical dealer who lays his net at the capitol of his country, and, after some three score years, more or less, devoted to the business, is planning to settle down and enjoy a reposeful life. Mr. Royce occasionally comes to New York to renew his youth, and is expected here to assist at the celebration of the discovery of this country the 12th of the month. One of the earliest workers in the telegraphic field, this Washington man possesses a very large acquaintance, particularly among old time telegraphists, but he has not been content to remain in ignorance of the wonderful development of electricity, and by steady and practical work has come to be a recognized authority in Washington on subjects electrical, as well as on many other subjects. Mr. Royce will be cordially welcomed on the occasion of his Columbus visit.

Col. L. W. Burnham, of the Electric Gas Lighting Company, of Boston, is again at the head of his company, after a protracted absence due to poor health, and is enjoying a full return of his old-time vigor and spirits. Colonel Burnham's company is recognized as one of the strongest in Boston, ably managed, and dealing in and manufacturing goods of perfect reliability, and to his pleasant forceful personality may be largely attributed the advanced position the business now occupies.

Mr. John C. English, of New Haven and Bridgeport and the rest of Connecticut, was a New York hobnobber last week, devoting his critical and analytical mind to looking up all the new things electrical that bobbed about the surface in the metropolis. Mr. English has extensive electric lighting interests and is general manager of the Bridgeport Electric Light Company, an organization that his energy and far-seeing work has made one of the most valuable lighting concerns in the State.

BI-POLAR.

The Hubinger & Pool Company's New Dynamo and Motor.

BY J. G. POOL.

The Hubinger & Pool Company, of New Haven, Conn., have recently brought out a new motor and dynamo, designed by Mr. J. G. Pool, the electrician of the company, and which are shown in the accompanying illustrations. The machine illustrated is of the multipolar type and possesses eight poles. It was designed especially for the purpose of operating electric yachts, weighs 500 pounds and develops four and one-half horse-power at 500 revolutions per minute with an efficiency of 90 per cent.

The machine is also especially applicable to mining work, portable hoisting and pumping machinery, fire engines and for all purposes where a motor may be required for service in wet or damp places, or where it may be exposed to the weather. Of course, it may be used also for any purposes where an electric motor or dynamo may be required.

The motor has been designed with special regard to efficiency and durability, and the protection of all wires and working parts from injury, either by moisture or otherwise.

The field magnets are ironclad, the exciting coils being entirely surrounded by iron, the magnetic circuit being exceedingly short and without break.

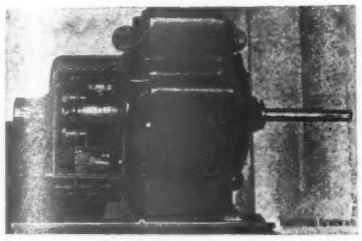


FIG. 2.—SHOWING COMMUTATOR AND BRUSHES OF HUBINGER & POOL DYNAMO.

The field magnets are laminated, being formed of alternate layers of the best charcoal iron and paper, similar to the construction used in armatures. Foucault currents are thereby entirely avoided and the machine runs cool even when overloaded.

The amount of wire necessary to excite the fields is very small, it being entirely surrounded by iron, and no trace of magnetism is perceptible outside the machine.

The armature is of special design, the wire being wound in grooves and entirely embedded beneath the surface, thereby reducing the gap between the armature and pole pieces to the smallest possible amount.

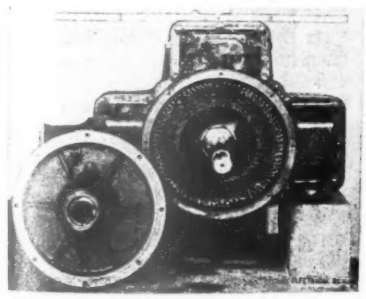


FIG. 3.—SHOWING END OF ARMATURE CASE, HUBINGER & POOL DYNAMO.

The winding of this armature is such that the actions which take place are precisely the same as those which occur in the best type of cylinder armature when placed in a bipolar field, each wire being carried in alternate directions under each pole constituting the field before being carried to the following bar of the commutator. Each wire is of exactly the same length as every other, and occupies an exactly similar position in the field.

The various wires forming the winding are connected in series without any cross connections of either commutator or wire, and only two brushes are required, set at a distance apart on the commutator equal to two ajacent neutral points of the field. The result of this method obviates entirely all of the objections which can be raised in regard to the multipolar style of machine, while all of the advantages of this method of construction are retained.

The disadvantages of the usual method of construction of multipolar machines are well understood by those conversant with them, it being usual to so wind the armature that the wire thereon is only influenced by the pole of the field, which may be directly opposed to it, thus causing a distinct electromotive force to be generated in each section of the wire of the armature constituting one polar surface, this electromotive force being supposed to be the electromotive force generated by the machine. Thus each section of the armature is supposed to generate the full electromotive force, while only such fraction of the current flows through each as may be represented by the number of poles in the field, these separate currents afterwards being united in multiple, either by cross connecting the commutator or by using as many brushes placed around the commutator as there are poles in the field.

Now, since these various currents are united in multiple, the electromotive forces must be directly opposed to each other, and since each pole generates a separate electromotive force in a separate portion of the wire, the tension of each must, necessarily, depend on a number of circumstances and conditions, which render it impossible to obtain a uniform electromotive force in each section of the wire in practice. Therefore, the stronger opposes the weaker, and the efficiency of the machine will be reduced accordingly.

Much might be said in regard to the actions and reactions which take place in such machines, but we think that what has been said will suffice to show that such construction is seriously defective in many ways.

In the armature of the machine shown, each pole of the field generates only a fraction of the total electromotive force, such fraction being represented by the total number of poles in the field, such electromotive forces being joined in series by the peculiar method adopted in winding without cross connections of any description, while the entire current makes the circuit throughout the entire field, thus producing the following conditions. Each portion of each wire is equally influenced by each of the poles of the field at each instant, thus producing perfect unity of action and electrical balance, independent of the strength of any individual pole of the field.

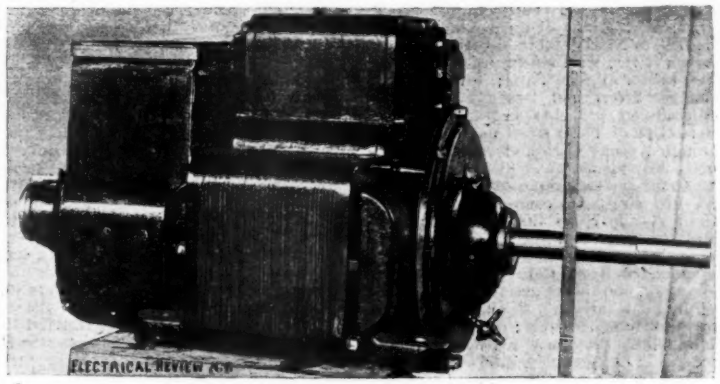


FIG. 1.—EXTERNAL VIEW OF HUBINGER & POOL DYNAMO.

This machine is shown in the illustrations as follows:

Fig. 1. External elevation from end opposite commutator.

Fig. 2. Shows machine turned 90 degrees from its proper vertical position in order to show commutator and brushes enclosed in box casing on end. This casing is covered with plate glass when in use.

Fig. 3. Shows end of armature case removed and end of armature as it appears in the field; also proportional size of armature to other dimensions of machine as well as the method of mounting the same on the shaft.

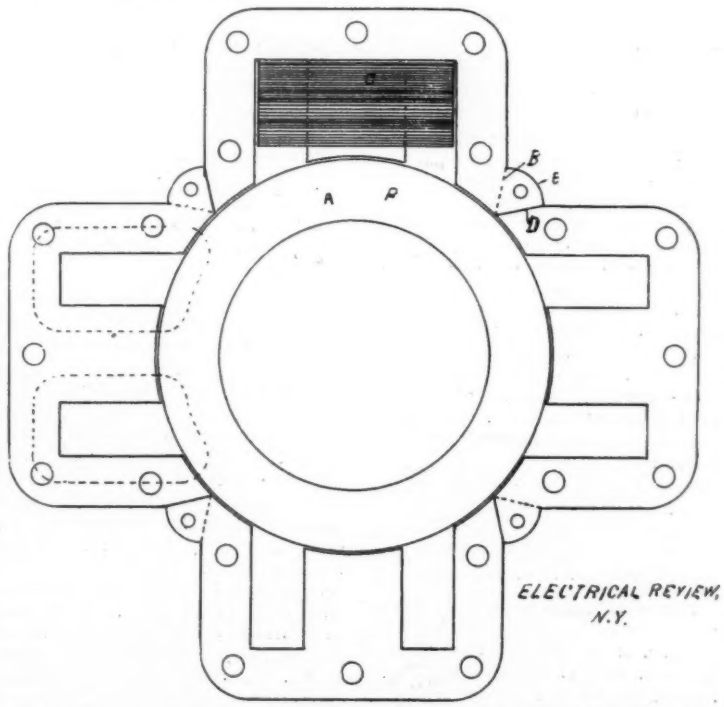


FIG. 6.—SHOWING CONSTRUCTION OF FIELD MAGNETS, HUBINGER & POOL DYNAMO.

Fig. 4. Shows the armature removed, as seen from the commutator end.

Figs. 5 and 6 are rough drawings illustrating the construction of the field magnets and proportional size of the armature. Fig. 5 is a detail of sheet-iron stamping, of which it is wholly composed, one die sufficing for all of the eight different positions in which it is placed. The manner in which this is accomplished is shown in Fig. 6. Four of these pieces are first placed together on a flat surface and secured in place by bolts or rods, the junctions appearing at the dotted lines, as shown in B, Fig. 6. The next layer is formed by reversing the pins, the junctions appearing at the solid lines D, Fig. 6, and this order of alternations is maintained throughout until the desired thickness is attained, thus producing a solid, substantial and laminated field having a short magnetic circuit without break and at a minimum cost.

The magnetic circuit is represented by dotted lines in one portion of the field and one field coil is also represented in place. The field coils are wound on spools and slipped in place, being afterwards secured by clips not shown. The magnetic circuit being very short, and with no break or joint, and the coils being entirely surrounded by iron, the amount of wire necessary to excite the fields is very small. The machine runs with absolutely no spark throughout its full range from full load to no load and *vice versa*. The direction of motion may also be reversed without moving the brushes and the machine operated throughout its full range of load and no spark will be produced. The brushes may be moved through an angle nearly equal to the angle formed by two adjacent neutral points of the field and not cause a spark.

The machine is self-oiling throughout and is entirely encased in iron, and may, if required, be placed and operated in the open air without covering or protection of any kind, in any weather or climate, thus affording a machine suitable for many purposes

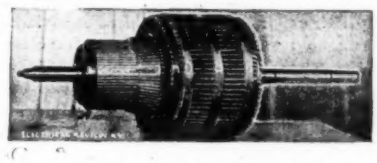


FIG. 4.—ARMATURE OF HUBINGER & POOL DYNAMO.

for which the electric motor has not heretofore been adapted. This machine is peculiarly suitable to the operation of electric yachts, for which purpose it was originally designed, as its high efficiency and slow speed enable the batteries, which must necessarily be employed in this case, to be operated at small loss and afford long runs for a given capacity of cells, while at the same time the motor is coupled direct to the propeller, thus avoiding all loss due to gearing of any description.

The design enables the machine to be placed in an open boat without other protection and with less disadvantage than an engine. A most ingenious switch is also manufactured by the company for controlling yacht motors.

F. H. Whipple Again in Trouble.

The Boston *Record* for September 27 published the following special dispatch from Pittsfield, Mass.:

PITTSFIELD, Sept. 26.—Chief of Police Nicholson to-day returned from Cleveland, O., having in custody F. H. Whipple, who is charged with obtaining money under false pretences. Whipple has been prominent in the electric business, and last month he induced C. G. Tompkins, of the Berkshire Electric Company, to indorse a draft for $100, drawn by F. H. Whipple on the Whipple Electrical Company, of Newport. The draft was cashed by the Pittsfield National Bank, and similar drafts for the same amount were cashed by the Third National Bank and the Agricultural Bank, Whipple being introduced by prominent business men. The drafts were all protested, no such concern as the Whipple Electrical Company being in existence.

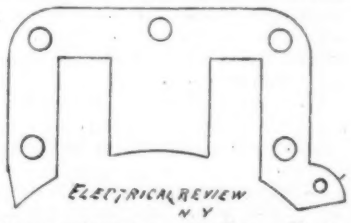


FIG. 5.—STAMPING FOR FIELD MAGNET OF HUBINGER & POOL DYNAMO.

When last heard from, previous to the above occurrence, Whipple was managing a theatrical troupe playing "O'Dowd's Neighbors."

THE TROLLEY TRIUMPHS.

After a Special and Stormy Session of the New York Board of Aldermen, the Advocates of the Trolley Win the Day—Four Franchises of the Nine Allowed will Permit a Trolley Road under the Elevated Railroad Structure from the Battery to One Hundred and Tenth Street.

After a stormy session, lasting over five hours, the New York Board of Aldermen, on September 29, granted nine franchises for trolley roads to the Metropolitan Traction Company, of this city. The day previous John D. Crimmins, the wealthy contractor who has recently become a street railway magnate, and William C. Whitney, ex-Secretary of the Navy, who is also largely interested in street railways, appeared before the Railroad Committee of the Board of Aldermen, as representatives of the Metropolitan Traction Company, and asked for nine franchises, all of which were favorably reported upon by the committee to the Board of Aldermen at its meeting on the 29th.

Twenty members of the Board of Aldermen were present at this meeting, the absentees numbering seven. Fifteen aldermen voted for the franchises. They were: Andrew A. Noonan, Nicholas T. Brown, William Clancy, Peter J. Dooling, Cornelius Flynn, Horatio S. Harris, Henry C. Hart, Joseph Martin, Abraham Mead, William H. Murphy, David J. Roche, Frank Rogers, Jacob C. Wud, C. J. Smith and Patrick J. Ryder. President John H. V. Arnold voted for three of the franchises, although he protested that he did not favor the trolley system. Then he excused himself, gave Vice-President Nocnan the gavel and put the responsibility on the 15 aldermen, who stuck together for five hours, or until the last franchise was passed.

The Railroad Committee first recommended that the Chambers and Duane Street Ferry Railroad Company, one of the Metropolitan Traction lines, be allowed to unite its tracks through Pitt and Delancey streets.

Alderman Morgan wanted this proviso put in:

And this consent is granted with the understanding that it shall not be construed to permit the use of motive power by means of electricity from overhead wires.

Alderman O'Beirne moved to refer to the corporation counsel for advice as to the powers of the board. Defeated—13 to 7.

The railroad committee recommended that permission should be given to the Metropolitan Traction Company to extend its line of leased road from Ninth avenue and Sixty-fourth street through Columbus avenue to One hundred and Tenth street, and through One hundred and Sixth street to Amsterdam avenue. On Columbus avenue the route is under the elevated road, and here it is proposed to use the trolley. The company in its application asks for the right to erect power houses along the route, agreeing to deposit $500,000 in the city treasury as a guarantee that the work will be done to the satisfaction of the commissioner of public works.

Alderman Morgan moved an amendment prohibiting the use of the trolley.

Alderman O'Beirne seconded it, and made a speech.

An amendment prohibiting in so many words the use of the trolley system was laid on the table. The second report was then adopted, President Arnold this time voting with the minority.

And so it went on, things getting hotter and hotter as the meeting progressed. As fast as a report was recommended by the railroad committee, a motion was promptly made to prohibit the use of electric power and as promptly tabled. When the smoke of the five hours' battle had cleared away it was found that the Metropolitan Traction Company had obtained from the Board of Aldermen just about all they had asked for. The Metropolitan Traction Company will have, however, to get the consent of the Railroad Commissioners, the Board of Electrical Control, and a majority of the property owners, before building a trolley line. These routes, as proposed to be unified and connected, are as follows:

From Twenty-third street and Broadway along Twenty-third street to Lexington avenue; up Lexington avenue to Twenty-seventh streets to connect with a line from Thirty-fifth street to Twenty-seventh street on Lexington avenue, in order to give the Broadway Railroad direct lines to the Grand Central Station and Thirty-fourth Street Ferry; an extension of the Lexington Avenue Line to Ninety-eighth street and to the Harlem River, with an extension on 116th street to Morningside Park; to connect the Chamber Street and Grand Street Ferry Railroads by branches beginning at the intersection of Third street and Avenue C, through Avenue C to and across Houston street, and thence by single track through Pitt street, across Stanton street to Delancey and Pitt streets, to connect the Sixth and Ninth avenue roads through West Fifty-third street; to join the Broadway line at South Fifth avenue and Broome street by an extension from Canal street and West Broadway, and thence across Canal street to South Fifth avenue, through the latter street to Broome street; to connect the Metropolitan Crosstown Railway by a line from Spring street and South Fifth avenue to Canal street and West Broadway, and thence along Broome street to Sullivan street, to Watts street, to the Houston, West street and Pavonia Ferry Company on West street, and to connect also with the Desbrosses Street Ferry Line; to connect the Pavonia Ferry Company with the Chambers street road at Houston street and Avenue C, and to extend the Ninth Avenue Line from West Sixty-fourth street to 110th street.

There will be, through these proposed connections in South Fifth avenue, at Broome, West Third and West Fifty-third streets and Columbus avenue, an available trolley route from the Battery to One hundred and Tenth street, mostly under the elevated roads.

Col. Frank K. Hain, general manager of the Manhattan Elevated Railroad system, said to a reporter for a daily paper that no application had been made by the Metropolitan Traction Company to string the trolley wires under the elevated railroad structures. If such application were made it would be for the board of directors of the company to decide whether permission to string the wires should be granted.

"Do you think the Manhattan Company would object to having the trolley wires strung under the elevated structures?" was asked.

"That I cannot tell," replied Colonel Hain. "I can't speak for the directors of the company. I suppose they will do what they think best."

"Wouldn't it be dangerous to string the wires under the iron structures of the 'L' road?"

"No, I don't think it would. The wires would be well insulated, and there would be no more danger in putting them in under the 'L' road than to put electric light wires in iron houses. As far as danger goes, it is dangerous to do most anything. It is dangerous to walk in the streets, as you may get run over by horse cars."

The following transfers were recorded in the register's office on September 29. It shows that the Crimmins syndicate is acquiring property in various parts of the city, probably to use the buildings as power stations:

Front st., 13 to 17; John D. Crimmins to Metropolitan Traction Co	$50,000
9th av., e. s., 65 ft. n. of 53d st.; 135 ft. to 54th st., 525x irregular; John D. Crimmins to Metropolitan Traction Co	312,500
53d st., n. s., 275 ft. W. of 8th av., 65.1x37.5x irregular; same to same	17,000
53d st., n. s., 484.11 ft. e. of 9th av., 25x39.3; same to same	4,500

There were rumors afloat that "boodle" was used to aid in securing the franchises, and even at the meeting of the Board of Aldermen hints of the Broadway surface railroad scandal in 1884 were made. A reporter for the *Herald*, which is rabidly opposed to the "deadly trolley," hunted up Mr. Richard Croker, the chief of Tammany Hall, and had the following conversation with him:

One report had it that a large boodle went into the treasury of Tammany Hall, and that great influence had been brought to bear upon the Tammany members of the board.

When Richard Croker was asked respecting these reports, he said:

"Not one dollar or one cent was paid to me or to any member of Tammany Hall by the Metropolitan Traction Company or any other company or person to my knowledge to have these franchises passed. They were passed because they will prove of great benefit to the people of this city if the railroads as laid out are built, and for no other reason."

"Did any of the members of the Board of Aldermen ask you how they should vote in regard to these railroad franchises?"

"Yes," said Mr. Croker, slowly, "some of them did. I told them to vote for all the railroad franchises that came up, as I thought that we needed more railroads in this city.

"I did not 'order' any one to vote for them. They were told to use their own judgment, but I said I favored more railroads. No pressure was brought to bear upon them by myself or Tammany Hall.

"This city needs more street railroads. It is away behind the times in respect to railroads. It is worse than some country towns in respect to lack of facilities for transportation.

"This has been a one-horse town long enough, and it is time that railroads that should have been built years ago were put down in our streets.

"These franchises, as I understand the matter, do not grant any one power to introduce the trolley system. If the property owners along the streets through which these new routes are laid do not wish the trolley system used—that settles it. The trolley cannot be adopted without their consent.

"The Metropolitan Traction Company has no more claim upon these franchises than any one else. They must go to the highest bidder. If any one else wants them, why, let them come in and bid for them. They are valuable franchises to others besides the Metropolitan Traction Company.

"If some one wanted to build a railroad in front of my house along Mount Morris avenue here I should favor it. I know it would increase the value of this house and I would benefit by it.

"What is there about this trolley system that the newspapers seem so violently opposed to it? Does it kill many persons?"

I suggested that it made the streets look unsightly by having them crossed by deadly electric wires that often got mixed up with telegraph wires and killed persons who touched them.

"Well, I confess," said Mr. Croker, "that I do not know much about the trolley system. In my opinion, if the trolley wires were strung under the 'L' road structures they would not be dangerous."

"Did Mr. Crimmins or any one connected with the Metropolitan Traction Company approach you, Mr. Croker, in regard to having these franchises passed?"

"No, sir. No one ever spoke a word to me regarding the franchises who owns stock in the Metropolitan Traction Company. I do not know whether Mr. Crimmins owns any of that company's stock. Because he is president it does not follow that he owns any of the stock. The owners of the stock of this company, I presume, are men who would not think of going to Tammany Hall to secure influence for getting franchises which they would have no trouble in securing in the regular way.

"You may depend upon it that these franchises were passed upon their merits, and I do not believe one cent was used to have them passed by the Board of Aldermen."

Of Course We Appreciate the German Technologist.

[From the New England *Courier*.]

It is to be noted that among the great number of American electrical journals the ELECTRICAL REVIEW stands foremost as regards information on European electrical matters. Nearly every one of its issues contains abstracts from articles published originally in Europe, while the average electrical contemporary in his American self-sufficiency has scanty food for his German-American reader. That this is true will be acknowledged by all German technologists living in the United States, and this is one of the reasons why the ELECTRICAL REVIEW is read by all German-speaking technical people. The editor ought to be congratulated on his tact and wise discernment, which will surely increase the already large circulation of the New York ELECTRICAL REVIEW.

Bent the Lightning.

[From Brooklyn *Life*.]

"I was going to bed the other night at my hotel at Sea Beach when a streak of lightning came in through the window and struck my mattress."

"What was the effect?"

"Bent the lightning double."

ELECTRIC LIGHT FLASHES.

Hamburg, Pa., has voted for electric lights.

Westfield, N. Y., will soon be lighted by electricity.

Work on the electric street lighting system of Laredo, Tex., has commenced.

Marion, Ala., is in a fair way to have an electric light plant established very soon.

The wires for the electric light system at Concord, N. H., are being rapidly strung.

The construction of the electric light plant at Mt. Washington, Md., is progressing rapidly.

Enough subscribers have been secured to warrant an electric light plant at Shell Lake, Wis.

The Chesapeake Light and Power Company, at Hampton, Va., opened its station September 2. A reception was held at the plant.

Additions to the Amoskeag, N. H., Company's electric light plant are being made which will increase the capacity considerably.

The Wilmington, N. C., Gas Company is making arrangements to enlarge its electric plant by the addition of two dynamos and a new engine and boiler.

Parties having leased the mill property at South Natick, Mass., are reticent of their plans of operation, but electric light for Wellesley seems to be the size of the new industry.

F. H. Osgood, of Seattle, Wash., president of the National Electric Tramway and Lighting Company, of Victoria, whose plant was burnt out some time ago, has replaced it with four new dynamos of 3,500 lights capacity. The new machinery is now being put in.

The Somerville, Mass., Electric Light Company is working hard these days placing new arc lights in position. About 100 extra lights will be in service after October 1, and they will be lighted all night instead of, as heretofore, only until one o'clock in the morning.

At a recent meeting of the Littleton, N. H., Water and Electric Light Company the following officers were elected: Directors, B. H. Corning, Chas. A. Coffin, E. Summerfield, B. A. May and John T. Martindale; clerk of the corporation, O. W. Hunkins.

Hoboken, N. J., is stirred up by the action of the common council in awarding to the Thomson-Houston Electric Light Company a contract for the lighting of the city for 10 years. The price is 38 cents a night per lamp for each of 156 arc lights. The resolution awarding the contract is in Mayor Stanton's hands.

On October 13, the Citizens' Electric Illuminating Company, of Brooklyn, N. Y., will open bids for a three story brick and iron building, an addition to their present plant at the corner of Rockwell Place and De Kalb avenue. The new building is to be 75 feet front by 100 feet deep and will provide for an additional capacity of 2,500 horse-power.

The electric lighting company at Sheboygan, Wis., began operating its new plant during the week. The capacity is 250 arc lamps, 2,000 candle-power, and 4,000 incandescent lamps. The amount expended so far in its construction is about $110,000. The company is also operating a power circuit for motors and has contracted to supply power for a number of concerns. About 75 horse-power has been taken up to this time.

The work on the new electric light plant in the Pennsylvania Railroad yards opposite the Union Station, Pittsburgh, is progressing very satisfactorily. The roof is on the building and the interior is being fitted up for the reception of the dynamos and other necessary machinery which will be put into the plant within a few days. All the electricity used for lighting the Union Station, the yards and the various buildings of the company between the city and East Liberty will be supplied from here. The work of stringing the necessary wires and making the connections will be at once executed.

MEDICAL ELECTRICITY.

EDITED BY DR. J. MOUNT BLEYER, NEW YORK.

The New Electrical Test for Fluid Excretions.

Lately, it has been found that the electrical test for determining the amount of urea is considered much more accurate and convenient than any of the other methods in use. These assertions are laid at the door of Dr. Dawson Turner. The following is the procedure adopted in making the test. The discharge is placed in a V-shaped tube, this being connected with a measuring bridge. We know that the resistance in the fluid depends mainly on the presence of chlorides. Dr. Turner's experience was in a case of pernicious anæmia, where it had a specific gravity of 1.017, 9.36 grains urea per ounce, on one day, and specific gravity 1.020 and 7.02 grains of urea on another. From this nothing definite could be deduced, whereas, much could be learned when one was told that the specific resistance in the one case was 68 and in the other 51 ohms. In several other experiments which he made, he determined the electrical resistance of various artificial fluids, and found that a three per cent. solution of urea gives a specific resistance of 382.5 ohms; a two per cent. solution, a resistance of 569.5 ohms; a two per cent. solution of sodium chloride gives a specific resistance of 29-25 ohms; a one per cent. solution 59.5 ohms; a two per cent. solution of sodium chloride, mixed with a 20 per cent. solution of grape sugar, gives a specific resistance of 51 ohms. The specific resistance of distilled water is found to be infinite, and that of ordinary spring water enormous.

Ozone Produced by Another Electrical Method.

It has been noticed that there are several ways of doing one and the same thing. Ozone has been produced by more than one method, though the last mode of production of ozone from the atmosphere by means of electricity has been published very recently by two Dutchmen, A. Schereller and W. J. Wisse, which mode possesses, at least, one novel feature. There is a so-called ozonizing chamber in their apparatus which is fitted with a number of electrodes enclosed in tubes of glass or other good dielectric * material.

These electrodes are alternately + and —, but they are joined up to a transformer or alternating current dynamo giving a large electromotive force, and their polarity is perpetually changing. The apparatus includes an arrangement for freeing the air of dust and moisture before it is allowed to pass into the ozonizing chamber.

The Electric Light as a Remedy for the Cure of Pains.

The electric light has in the last few years aided medical science in its researches so much that no amount of praise can repay its value. We see it given a prominent notice in the *La France Medicale* by Von Stein, of Moscow, as reporting his experience in several cases of different painful affections which have been relieved, as if by magic, by the electric light. The apparatus which he uses consists of a small incandescent lamp about two inches long, with a reflector in the shape of a funnel, which is applied directly to the skin over the seat of pain. For the head and neck it is left in position for 10 or 15 seconds, but for other parts of the body it remains from one to five minutes, or until the patient complains of the heat. The author of these experiments has obtained remarkable curative results in cases of intercostal neuralgia, rheumatic pains of the shoulder, lumbago and severe pain in other portions of the body. He tells that the number of applications for permanent relief differs much, sometimes one being all that is necessary.

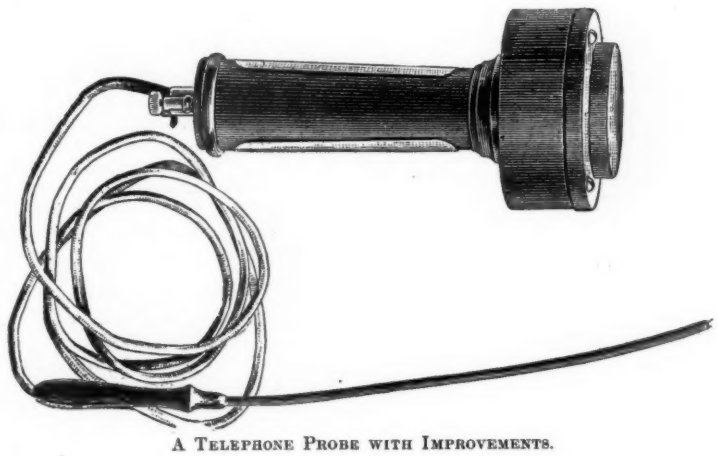
This one observer seems not to stand alone in the race for priority in the discovery that the electric light and sun-light with their heating rays, are curative agents for pains. It is reported that a California physician, Dr. Fryer, uses a concentrated beam of sunlight for the treatment of malignant disease. The remedy, he says, was used by some cancer doctor, from whom he purchased the right of usage. Dr. Fryer read a paper on the subject before one of the local societies, and several example cases were there demonstrated.

* A substance which permits induction to take place through its mass. All non-conductors or insulators are dielectric. Faraday regarded the dielectric as the true seat of electric phenomena. Conducting substances he considered as mere breaks in the continuity of the dielectric. This is the view now generally held.

A Telephone Probe with Improvements.

To Dr. Howey B. Bashore, of West Fairview, Pa., is given the credit of improving the telephone probe. This probe is made by certain alterations in it more practical and useful. He dispenses with the battery entirely, and only makes use of the telephone and probe. To the handle of the telephone are fastened, at opposite points, a zinc and copper plate. The zinc plate is connected with one end of the coil, the copper plate with one binding post, and the remaining end of the coil with the other binding post.

All these connections have been made in the handle of the telephone, and only the two plates are visible. By grasping the handle of the telephone with the hand a current is generated, due to the contact of two dissimilar metals. This is made apparent, if the circuit be closed, by a clicking sound in the instrument; and this sound



A Telephone Probe with Improvements.

is heard whenever a current is "made" or "broken" between two good conductors, that is, the metals and carbon. The probe consists of a flexible canula, containing two insulated wires, the tips of which project a short distance beyond the canula. The flexibility of the probe is, I think, a distinct feature.

If, now, the handle of the instrument be grasped, and the projecting tips of the probe come in contact with a metal, such as a bullet in the tissues of the body, a metallic contact is made, and the indication is given in the telephone.

Of all electrical probes the telephone must be the most reliable and efficient; for the telephone, used as a current indicator, is the most sensitive galvanometer we possess, indicating a current less than .000001 that of a Leclanche cell. In comparison with any other probe, using the electricity of the body, this must be the most efficient, as giving the least trouble for its arrangement, and indicating the presence of any metal, whether similar to that of the terminals or not.

This instrument made for doctors by Leach & Greene, of Boston.

Some Points on the Galvanic and Faradic Treatment.

Prof. F. Raymond, of the Paris Faculty of Medicine, gives his points in the use of these currents in the following manner, especially laying stress in the treatment of muscular atrophy: In speaking on this malady he said that the muscles can be treated either by the galvanic or faradic currents.

If the faradic electricity is employed while the muscle is in communication with the conductors, this particular muscle undergoes a series of rapid contractions, while, on the contrary, if the galvanic current is applied only two contractions are obtained, one when the current is opened, the other when it is closed.

Hence for the stimulation of the contractility of muscular fibres, the faradic current is the one to be recommended; and the mode of applying this faradic current according to what we desire to obtain, either local faradization or a generalized one. The localized faradization has for its object to act on an individual muscle; it is either direct or indirect.

Direct faradization is to influence the muscular substance directly. For this purpose the two moist electrodes are placed on the external integument corresponding to the muscle to be electrified; the dry electrodes are only to be used when the superficial integuments are to be influenced.

Indirect faradization is used to obtain a contraction of the muscle through the intermediary of the motor nerves which supply it. One electrode is to be applied at any indifferent part, while the other, the active electrode, is to be placed in a region where the nerve trunk which is to be influenced passes superficially. Each local faradization must be continued for 10 minutes at one seating.

Generalized faradization, on the other hand, has for its object to act on all the peripheral nerves. The patient is placed on a chair, with his bare feet resting on a stool, presenting the form of an inclined plane. This inclined plane is covered with a plate of iron or copper, which is separated from the patient's feet by a piece of moist flannel. This plate is in communication with the fixed pole of an induction electrical apparatus; the other pole terminates in a wire brush or a wet sponge, which is to be applied to the different regions of the body, beginning at the back of the neck, applying the brush especially on the painful spots and regions corresponding to the first, second and seventh cervical vertebræ. It is then carried successively to each side of the back, on the chest, abdomen, and especially in the epigastric region (on account of the solar plexus), the upper and lower extremities, and, finally, the head is faradized, using here the hand as an electrode. Each sitting ought to last about 15 minutes and be divided as follows: One minute for the head, four for the neck and cervical region, three for the back, three for the abdomen and four for the extremities.

In the treatment of muscular atrophy due to a spinal lesion, anterior polyomyelitis, or progressive amyatrophy, we must act at the same time upon the central lesion and the peripheral alteration of muscles. To restore the contractility of muscular fibres, faradization of the involved muscles must be recommended; while, on the contrary, to combat the spinal lesion, and to act favorably on the nutrition of the anatomical elements and tissues, we must resort to galvanization of the vertebral column.

The galvanization is to be done by applying the positive pole at the back of the neck and the negative one in the lumbar region. This is kept up for two minutes, when the poles are reversed, positive in the lumbar region and negative in the back of the neck. Two or three sittings a week are to be recommended. In acute anterior polyomyelitis, or in lesions of recent occurrence, galvanization must be kept up for from two to four minutes. In spinal lesions of slow progression the electrical treatment is to be kept up longer. In recent cases the treatment must last from six months to one year; in old cases two applications of the current, of three months' duration, are called for yearly.

Diagnosing Dilation and Tumors of the Stomach by Trans-illumination of the Interior of the Stomach with the Electric Light.

The larynx, the antrum of Hymore, the orbital region, all have thus far been trans-illuminated by means of the electric light, and through its valuable aid many a difficult diagnosis regarding the seat of the disease has been set aside. The next organ is the stomach, which can now also be illuminated without any difficulty whatsoever, and through this trans-illumination we can easily make out on what side, or to what extent, either the dilation exists or the size of the tumor and seat of its growth. The trans-illumination is not difficult. A dark room is necessary. The appliances are not costly to construct. The method places again in the hands of the scientific physician another weapon to fight his antagonist—Death!

"THE DEADLY ELECTRIC CURRENT" AND THE PRESS.

COMMENT IS UNNECESSARY.

Killed Instantly by Electricity.

(From the New York *Evening Sun.*)

BOSTON, Sept. 23.—Last evening Thomas O'Brien, aged 22, an employé of the Boston Electric Light Company, came in contact with the crank journal while washing his hands at the Sumner street works, and was instantly killed.

Not Killed by Electricity.

AN INVESTIGATION SHOWS THAT THOMAS O'BRIEN PROBABLY DIED OF HEART DISEASE.

(From the Boston *Transcript*, September 23.)

An employé of the Boston Electric Light Company, named Thomas O'Brien, whose death at the works last night was reported this morning to have been caused by an electric shock, died, it appeared after the remains had been viewed by the medical examiner, of heart disease.

O'Brien, who was employed to fill oil cups and clean machines when not in use, had finished a part of his work and was on his way to a locker 200 feet from the sink, where he had just been standing, when he was seen to throw up his hands and fall backward to the floor. In no possible way could the man have come in contact with the crank journals or what is known as the "current general" at the place where his body lay when his fellow workmen reached his side.

A dynamo near by was in operation, but a person placing his hand on the machine would receive only a slight shock. Besides, say the folks at the electric light works, no one receiving an electric shock ever throws up his hands. On the contrary the arms are kept in the position they happen to be in when the shock comes.

The body of O'Brien was sent to the Emergency Hospital, where the remains were viewed by Assistant Medical Examiner Stedman. No marks could be found anywhere that indicated a shock to have been the cause of death. On the right hand, between the thumb and forefinger, were two little burns, but these, it was remembered by one of O'Brien's fellow workmen, were made several days ago. The examining physician attributed death to heart disease. O'Brien was about 25 years of age. He had been married recently and lived in Brighton. He was strong and robust in build, apparently in perfect health.

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CONTENTS.

	PAGE.
Views, News and Interviews	73
Electric Illumination at Washington	73
Light and Power Stations	73
American Institute of Electrical Engineers.	74
Civil Service Examinations for Belgian Telephone Operators	74
The Boston Y. M. C. A.	74
Electrical People We Meet	74
The Hubinger & Pool Company's New Dynamo and Motor	75
F. H. Whipple Again in Trouble	75
The Trolley Triumphs	76
Of Course We Appreciate the German Element	76
Bent the Lightning	76
Electric Light Flashes	76
Medical Electricity	77
"The Deadly Electric Current" and the Press	77
The Electric Light in Horticulture	78
The Trolley in New York	78
Correspondence:	
Our Boston Letter	79
Our Chicago Letter	79
Letters From a Laboratory	79
"C. & C." Electric Generators at the World's Fair	79
Personal	79
Charles D. Shain is Siemens & Halske's Eastern Agent	79
"Ward" Ornamental Arc Lamps	80
Tesla's Experiments	80
Literary	81
Telephone Chat	82
Electric Cake	82
Telegraph News	82
Siemens & Halske Electric Machinery	82
Advance Information	83
Kindred Interests	84
A Compliment for "K. K." Wire	84
Electrical Patents	x
The Pure Food Exposition	x
The Medical Profession in Need of An Electrical Publication	x

INDEX OF ADVERTISERS.

COVER PAGES.	PAGE.
American Electrical Works	i
Ansonia Brass & Copper Co	xvi
Armington & Sims	xvi
Babcock & Wilcox Co	xvi
Beacon Vacuum Pump Co	i
Bogert, A. L.	i
Brush Electric Co	xv
Bryant Electric Co	i
"C. & C." Electric Motor Co	xv
Crocker-Wheeler Motor Co	i
Dixon Crucible Co	xvi
Eastern Electric Cable Co	xvi
Eddy Electric Mfg. Co	i
Hampson & Co., E. P	xvi
Jewell Belting Co	xvi
Kellogg Iron Works	ii
Link Belt Engineering Co	i
Moore, Alfred F	xvi
Noye Mfg. Co., John T	xvi
Okonite Co	i & xv
Otis Bros. & Co	xvi
Perkins Electric Lamp Co	i
Schuyler Electric Co	xv
Simplex Electrical Co	i
Star Electrix Co	i
Waldo & Stout	i
Waterhouse Bros	i
Weston Engine Co	i
Wilmot & Hobbs Mfg. Co	xvi

INSIDE PAGES.	
Allis & Co., Edward P	xi
American Bell Telephone Co	xii
American Engine Co	ix
Baker & Co	84
Ball Electric Light Co	iv
Ball Engine Co	x
Barnes Co., W. F. & John	xi
Barrett, John A	x
Benedict & Burnham Mfg. Co	iii
Bickford & Francis Belting Co	ix
Bishop Gutta Percha Co	viii
Blaisdell & Co	xi
Brill Co., J. G	vi
Buckeye Engine Co	xii
Burton Electric Co	xiii
Central Electric Co	xiii
Chandler, Ffrench & Co	84
Church & Sleight	84
Cowles Electric Smelting and Aluminum Co	xii
Cutter Electrical & Mfg. Co	viii
Davis, Chas. H	x
Day's Kerite	viii
Detroit Electrical Works	viii
Dewey Electric Heating Co	vi
Dwight Slate Machine Co	xi
Electric Construction and Supply Co	iii
Electrical Mfg. Co	iv
Electric Secret Service Co	iv
Electro-Light Engraving Co	xii
Empire China Works	xii
Eureka Tempered Copper Co	vii
Faraday Carbon Co	xiii
Falls Rivet & Machine Co	xi
Fitzgerald, S. G	x
Garvin Machine Co	xi
General Electric Co	v
Greeley & Co., The E. S	vi & 84
Harrisburg Foundry & Machine Works	xi
Hart & Hegeman Mfg. Co	x
Heisler Electric Co	iii
Holman Electrical Co., F	xii
Holmes, Booth & Haydens	vi
Hulbert Fence & Wire Co	84
Independent Bung Co	xii
Interior Conduit and Insulation Co	vii
Johns Mfg. Co., H. W	vii
Klipstein, A	xiii
Leclanche Battery Co	ix
Lehigh Valley Creosoting Co	ix
MacKie, Robb	84
Marshall, Wm	xiii
Merchant & Co	xiii
National Electric Mfg. Co	vi
National Pipe Bending Co	xi
New England Butt Co	iv
Newton Rubber Co	viii
New York Belting and Packing Co	xiii
New York Insulated Wire Co	iv
New York & Ohio Co	xii
Onondaga Dynamo Co	xii
Ostrander & Co., W. R	xii
Penn Life Co	x
Pennsylvania Electric Engineering Co	viii
Phœnix Glass Co	xiii
Phosphor Bronze Smelting Co	x
Pope Mfg. Co	84
Prentiss Tool & Supply Co	84
Queen & Co	ix
Reed & Co., F. E	xi
Railway Equipment Co	iv
Rhode Island Tool Co	vii
Ries Electric Specialty Co	vi
Ridlon & Co., Frank	84
Rosenbaum, Wm. A	x
Royce & Marean	xii
Samson Cordage Works	viii
Sawyer-Man Electric Co	xiii
Shawmut Fuse Wire Co	xi
Solar Carbon & Mfg. Co	x
Standard Paint Co	84
Standard Railway Supply Co	x
Stanley Electric Mfg. Co	ix
Stocking, E. B	x
Swan & Lane	x
Time Electric Co	84
Transport	vii
Tyndall, Wm. D	x
Waddell-Entz Electric Co	xii
Walworth Mfg. Co	iii
Washburn & Moen Mfg. Co	x
Watson & Stillman	xi
Western Electric Co	vi & vii
Westinghouse Electric & Mfg. Co	xiv
Wheeler Condenser & Eng. Co	vi
Willard & Co., C. P	84
Willson, H. B	x
Wood, John, Jr	xi

The *Evening Post*, an anti-trolley newspaper of this city, admits that it finds no particular opposition to the use of electricity on the part of the citizens of New York. Just so. The people desire this improved method of transportation, and it now appears they will get it. Some of our other great anti-trolley daily editors should think some big thoughts over this candid admission of the *Post*. As "mouilders of public opinion" they have not been conspicuous successes.

Our illustrations of the electrical effects produced during the recent G. A. R. meeting at Washington show what beautiful results can be obtained by the intelligent use of colored incandescent lamps of small candle power. This business of electrical decoration is one that is developing at a rapid rate. Its applications and uses are of the most flexible nature. It is expected that the electrical decorations of New York city during the Columbus celebration this month will be of a most artistic and interesting character.

New York policemen have donned their long-tailed coats again, and this is a sign that winter is coming. The occurrence also serves as a reminder to electric railway managers to look to their electric car heaters and electric snow plows.

The technical colleges will soon inaugurate their annual sessions, and another batch of coming electrical engineers will begin their evolution. Formula for producing an electrical engineer: College course × practical experience = electrical engineer. Element of time = two to four years.

Dr. Bleyer's department of "Medical Electricity" is meeting a long-felt want. The physicians of the country appreciate this bit of enterprise on the part of the ELECTRICAL REVIEW, as our subscription books attest. Electrical manufacturers should keep posted on developments in this department.

The meeting of the American Electro-Therapeutic Association, which is taking place in this city this week, is of unusual interest to physicians. Their profession necessarily requires them to be students and they are all eager to learn of the latest electrical developments and their application to the science of medicine. The addresses expected at this meeting are of an unusually instructive nature, and will be read before an appreciative audience.

The near approach of the long winter nights is giving a great impetus to the electric lighting companies. Central and isolated stations are being overhauled and many are making considerable additions to the capacity of the plants. Manufacturers of apparatus are consequently rushed with orders, alternating generators being in special demand. This is the season of installation for lighting plants and everything is booming, from steam engines to lamps.

We publish elsewhere in this issue a brief account of some of the electric machinery which the Siemens & Halske Electric Company of America will manufacture at its Chicago factory when it is completed. The advent of this company is a matter of interest to the electrical industry, as the prominence of the Siemens & Halske apparatus abroad warrants that a company manufacturing it in the United States will be a factor of importance. Siemens & Halske, of Berlin, are interested to a large, but not a controlling, extent in the new firm, the character of which will be entirely American.

THE ELECTRIC LIGHT IN HORTICULTURE.

In the second report upon electro-horticulture, published by the Agricultural Experiment Station of Cornell University, Mr. L. H. Bailey, the professor of horticulture, states that "He is convinced that the electric light can be used to advantage in the forcing of some plants."

In the body of the report are accounts of numerous experiments that have been carried on successfully at Ithaca, N. Y., to determine accurately whether the continued use of the arc light would be of sufficient benefit to guarantee the installation of forcing houses, such as he describes, for the growing of our winter vegetables.

The results show that lettuce was most benefited by the night illumination; other plants, spinach and cauliflower, tend to grow taller, but more spindling, while radishes and beets were decidedly hurt by the light when it was hung inside of the house, but when hung outside of the house, the plants, as a rule, matured much earlier than under ordinary conditions.

It seems from this report that the plants and trees require the darkness in which to grow, and, like human beings, need the night to sleep and rest their weary limbs.

We hope that these experiments will prove entirely successful, and that it will be shown that the electric light for the forcing of plants will be added to the already long list of valuable applications of electricity to domestic economy.

THE TROLLEY IN NEW YORK.

Now that the Metropolitan Traction Company, of this city, has obtained from the Board of Aldermen a number of franchises which permit the use of the overhead trolley system on certain streets of New York, there is but one more important step to be taken before the residents of this great metropolis can have what nearly every little Western town possesses—a system of electrical rapid transit. The method of construction which is possible over a large portion of the proposed route from the Battery to One Hundred and Tenth street is such that the "unsightliness" of trolley roads, which has so often been mentioned as a negative argument, will amount to nothing. The elevated railroad structure can be used over a great portion of the way for suspending the trolley wire, thus avoiding the use of many poles; therefore, the property owners' consent may the more easily be obtained. The Board of Electrical Control is bound to approve any safe method of construction which is in line with the best engineering practice, and this, in all probability, is the kind of construction contemplated. The important consideration is that the consent of the State Board of Railroad Commissioners must be obtained before the trolley can be installed. This board has evinced its progressiveness and broad mindedness on several occasions, notably, when it approved the trolley system for the city of Brooklyn. So there is not much to fear on this score.

On the whole, the prospects for the introduction of the trolley system into the heart of the American metropolis are very flattering. The good news has been a long time coming, but it seems to have got here at last.

Although it is proposed to utilize the elevated railroad structure as a support for the trolley wire, the two systems of transit will not assume the role of competitors. The elevated railways of this city have to-day enough traffic in sight between the region north of One Hundred and Twenty-fifth street and that south of Fourteenth street to require the major portion of their facilities operated as express trains. Now let the trolley system be installed over practically the same routes and utilize its flexible facilities for local traffic. These two methods of rapid transit working in harmony would solve the problem, at least until we can get our underground electric railways running.

Perhaps we may go so far as to suggest that an arrangement might be made between the Manhattan Railway Company and the Metropolitan Traction Company by which a combination ticket at a slightly advanced price would be sold to a passenger riding on elevated express trains to be used in finishing his journey on the trolley road. Suppose a man desires to go from his home on One Hundred and Thirty-fourth street, near Seventh avenue, to his office on Sixth avenue, near Eighth street. He walks to the elevated station at One Hundred and Thirty-fifth street and Ninth avenue, boards one of the large number of express trains running under five minutes headway, and rides on it to, let us say, Fourteenth street, one of four or five stopping places for express trains. Here he leaves the elevated road and boards a trolley car which carries him to his office. He pays his fare on the trolley car with a coupon which was attached to his elevated ticket, for which he paid, say, seven cents.

Whether such a system of combination rapid transit is feasible or not, the fact remains that the prospects for the trolley in New York are rosy, and that, instead of being condemned, extensions of such roads will be asked for until the horse car will be a rare sight.

The Providence *Journal* gives evidence of its appreciation of what is progressive and practical when it says editorially:

"There is no system of conveying power to street cars yet known which is so effective and safe as the trolley. Its introduction into Providence and New York will benefit each city, and the opposition to it would speedily vanish after intelligent investigations of the merits of the case."

CORRESPONDENCE.

OUR BOSTON LETTER.

Mr. Frank Harrington, the genial representative of the New York Insulated Wire Company, was in the city to-day.

The Diamond Machine Company, of Providence, is manufacturing a new grinding lathe which weighs 4,000 pounds.

Mr. J. F. Munsie, of the Munsie-Coles Subway Company, Brooklyn, N. Y., was a visitor to-day among the electrical fraternity of this city.

The Corliss Steam Engine Company, of Providence, has just completed a large engine for the Somerton Tin Plate Works, of Brooklyn, N. Y.

The Humphrey Machine Company, of Keene, has completed a pair of 33-inch and a pair of 36-inch horizontal wheels, and is making 48-inch and 55-inch wheels for a Maine concern.

Messrs. A. P. Gage & Son, dealers in physical and chemical apparatus, have removed from No. 402 Main street, Charlestown, Mass., to No. 73 Federal street, this city.

Mr. S. S. Sherman, general agent of the Boston Vacuum Pump & Electrical Company, this city, has just returned from a long business trip and reports having met with success.

Mr. Louis McLaughlin, son of the Hon. Hugh McLaughlin, of the Citizens' Electric Illuminating Company, Brooklyn, N. Y., is temporarily residing at Lynn, Mass., and he is taking the "alternating course" at one of the factories of the General Electric Company.

The Salem, Mass., board of aldermen last evening concurred with the common council in passing an order to put in the Metropolitan duplex police telephone system. It is understood that the mayor signed the order, and the work of putting in the system will begin to-day.

The Whitney Instrument Company, until recently located at Manchester, N. H., has removed its plant to the town of Pennacook, N. H., where its manufacturing facilities have been greatly increased. The company will now be enabled to promptly fill orders for its popular ammeters and voltmeters.

The Boston Society of Operative Electricians meet at the American House, this city, the first and third Wednesday of each month. This society was organized recently for the purpose of holding fortnightly meetings, when scientific papers will be read and members otherwise benefited in many respects.

The Beacon Vacuum Pump & Electrical Company, this city, manufacturers of the "Beacon" incandescent lamp, has established a branch office in the Central Building, No. 141 Liberty street, New York. Messrs. James T. Hanbay and Jay Holmes will have charge of the new office. A heavy and varied stock will be carried to meet the demand for "Beacon" lamps from various points in the Middle States.

Fred. A. Swan, of Swan & Lane, electrical engineers, Boston, has returned from a three weeks' business trip in Maine. He was specially requested to superintend the wiring of the Augusta Opera House, as he has had considerable experience at that work. The electrical equipment was 400 lights. While away he secured a contract from the Mr. Battie Woolen Mill, of Camden, Me., for a 300 light Jenney plant.

The German Technological Society, of this city, will give an entertainment for the benefit of the Kindergarten of the Blind on Wednesday evening, October 5, at Berkeley Hall, this city. Dr. Wm. W. Jacques, chief electrician of the American Bell Telephone Company, will deliver a lecture, the subject being "Electrical Gleanings." The lecture will be preceded by a concert. Several prominent vocalists and artists have kindly volunteered their talents.

The Peabody, Mass., Town Electric Plant, the first in the State to be established under Chapter 350 of the acts of 1891, was successfully placed in operation this evening. The entire town, except West Peabody, is lighted by 150 arc lights of 1,200 candle-power. The plant cost $50,000, and consists of a brick power station, with 125 foot chimney, 150 horse-power engine, two 125 horse-power boilers, four dynamos with a capacity of 194 arc lamps.

The Redding Electric Company, No. 41 Federal street, this city, are about to put on the market a new and attractive line of decorated china switches. Manager Nicholls exhibited to your representative several of the switches fresh from the factory of the Iona Manufacturing Company. The switches are very pretty in design and finish, and, being among the most reliable and serviceable electrical devices of its kind, makes it a safe prediction to say that the Iona switch is destined to meet with a wide-spread sale. The Redding Electric Company, being the selling agents for the product of the Iona Manufacturing Company, will carry in stock about 50 patterns of the decorated switches referred to. The former company has selected 10 of the most artistic designs and incurred considerable expense having these painted in colors on heavy cardboard, and will be sent as sample sheets to electrical supply houses, architects and house decorators, thus enabling them to select at a glance any style of decorated china switch desired without first having seen the goods. This will obviate the necessity of sending a long distance for a line of samples. The illuminated sample card referred to is a beautiful picture, and will adorn any wall on which it is placed. Any one not receiving one of these cards should write to the Redding Electric Company at the address above given. W. I. B.

Boston, October 1.

OUR CHICAGO LETTER.

Charles D. Shain, selling agent for the Weston voltmeters, was in the city during the past week.

George Cutter reports some large orders for his street fixtures on which he has recently made a number of improvements.

The Standard Electric Company, this city, has just closed a contract with the officials of the city of Cincinnati, O., to furnish them 50 arc light machines.

The Western Electric Company report having secured the contract for a 300 arc light plant for the Philadelphia and Reading terminal station at Philadelphia, Pa.

The Central Electric Company report having secured an order for 1,000,000 feet of Okonite wire this week, and find it impossible to keep any stock on hand owing to the large demand for this well known wire.

The Railway Equipment Company report having received another large order for overhead material from the Atlantic avenue road, of Brooklyn, N. Y. Also that they are making heavy shipments of supplies to Toronto and Montreal this week.

C. A. Brown Addressed the Chicago Electrical Association September 27, on the subject, "What Constitutes an Invention." His paper showed that none of the current definitions of the term "invention" were exact, and that it would seem to take a better appreciation of those faculties which are exercised by the inventor in order to properly define the term. The discussion brought out a number of interesting points in the same general line of thought.

Dr. John McKinlock, of the Central Electric Company, will shortly resume the practice of medicine again, after having spent the last two years in the interests of the Central Electric Company. Although he still retains his interest in the company, he will take no active part in the business management. Dr. McKinlock has had 12 years practical experience, and his many friends in the electrical line will no doubt seek him in case of trouble and secure the relief to be derived from his long experience. Dr. McKinlock will occupy suite of rooms 803 to 806 in the Venetian building, No. 34 Washington street.

The Largest Contract ever placed at one time in the West for electric railway equipment was given out Wednesday this week, when the Westinghouse Electric Manufacturing Company closed a contract with the Chicago City Railway Company for the complete equipment of 61 cars with their single reduction type motor; also four 200 horse-power generators for their cross-town lines. The Chicago City Railway Company, with their usual amount of energy and push, has long felt the necessity of giving their patrons of the cross-town lines better accommodations, and have concluded that electricity is the only means to serve the purpose. These lines are now operated by horses, and it is needless to say the change will be much appreciated by the people who are obliged to use them.

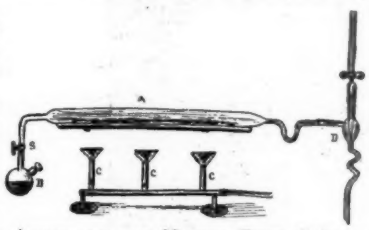
Chicago, October 1. M. J. B.

To the *Review of Reviews* for October Mr. Stead, the English editor, contributes one of his raciest character sketches, this time dealing with Mr. Gladstone's new Cabinet in a bunch, so to speak, rather than with some single personage. The article throws many a bright side-light on contemporary English politics, and hits off in Mr. Stead's fearless and always felicitous manner the 20 or more men who now lead the Liberal English hosts. Mr. Shaw, the American editor of the *Review of Reviews*, writes of two great Americans, Whittier and George William Curtis, the article containing not only recent portraits of these two eminent men, but also very interesting pictures of them as they appeared 40 years ago.

LETTERS FROM A LABORATORY.—XV.

BY JULIAN A. MOSES.

Ever since Sir Humphrey Davy isolated the two metals, potassium and sodium from their respective oxides by means of the electric current, there have been numerous inventors (what we might call modern alchemists), who are seeking to isolate by the same means, chemically pure carbon in the form of the diamond. The reason why they have not been successful so far is, it is said because carbon exists in three different forms, viz., in the transparent, clear or colored, crystalline form as the diamond; or in the amorphous, as lamp black; or in the dull grayish and amorphous form, as graphite. No accurate determination has been made to show that they are exactly the same; and I believe that they are but different combinations of hydrogen with carbon, the diamond alone being the pure carbon. If we freeze salt water the salt or whatever is suspended in solution is separated from it and deposited as pure crystals. In fact, all through nature, we might apply the well known proverb, "Birds of a feather flock together." Dana in his "Coral Islands" states that on the guano islands of the South Pacific, while the different kinds of birds would associate and fight with each other in the air, as soon as they landed on *terra firma* they had their separate colonies and were entirely exclusive. I ascribe the purity and transparency of the diamond to the fact that the pure carbon has become crystallized, and all impurities or foreign matters have been excluded, leaving it "A gem of purest ray serene." In all solids there is always a tendency of the atoms to come together; they have a natural attraction for each other, while in gases the atoms bombard each other and try to get away from each other as much as possible, so that their shape is only limited by the shape of the vessel that holds them.



APPARATUS FOR MAKING PURE CARBON.

There can be no doubt that the diamond is only pure carbon, for this has been demonstrated by chemical analysis. A diamond was burned in pure oxygen, and the resulting analysis showed that it had been converted into pure carbon dioxide. There were no other products of combustion. Hence chemists have tried to isolate the diamond, the hardest of all known substances, from the gas CO_2 or from some other of the many compounds of carbon. They have never been known to be entirely successful. A French chemist, it is said, has recently succeeded in making miniature diamonds that are visible only under the microscope; but whether this has been accomplished through chemical means or by the decomposing power of the electric current, I cannot say. However, a means for making an extremely hard form of carbon is known, and this substance, though in finely divided particles, possesses some of the properties of the diamond as found in nature. This process was invented by Dr. Otto A. Moses, in January, 1880, while in the laboratory of Mr. Edison, which was at that time in Menlo Park, N. J.

The process consists in the decomposing of the bisulphide of carbon into its two component parts, carbon and sulphur. The arrangement of the apparatus for the manufacture of this substance is shown herewith.

A long glass tube "A," resting on a copper strip "G" to support it while hot and soft, and containing scraps of chemically pure copper, and a few pieces of gas carbon is connected with a reservoir "B" which holds some bisulphide of carbon. Attached to the tube at "D" is filtering pump, or a Geissler vacuum pump; the tube is heated by the Bunsen flames "C." When all the air is exhausted from the tube "A," the stopcock "S" is opened and the vapor of carbon bisulphide rushes into the chamber "A." The gas is now lighted and the heated copper abstracts the sulphur from the carbon bisulphide, making copper sulphide while carbon is precipitated in an amorphous platinum-gray powder which possesses extreme hardness, almost equal to that of the diamond. This powder can be used as a polishing material which would, I believe, be found satisfactory for polishing some of the softer precious stones and possibly the diamond itself. At the present time a polishing powder is being made which, I believe, is manufactured by this process, and it is said that it has given entire satisfaction. This compound is probably a different form of carbon.

In this age of rapidity we must hasten even nature herself. Some ingenious man not being satisfied with the slowness with which the oyster built up his beautiful charge, helped him along by introducing into his shell some pieces of foreign material around which the bivalve could wrap his lustrous coating, thus lessening the amount of secreted matter and increasing the size of the pearl, for the same amount of secretion. These efforts were rewarded with considerable profit, so naturally others have followed suit by trying to make that more beautiful and valuable gem, the diamond.

The so-called voltaic diamonds are not made by the aid of electricity, as one would be led to believe by the name, but are either quartz crystals cut and polished, or some of the many good formulæ for paste from which factitious gems are made.

"C. & C." Electric Generators at the World's Fair.

The "C. & C." Electric Motor Company, of this city, have recently received an order from the chief of construction of the World's Columbian Exposition for two generators of 110 horse-power each to be used to furnish current to the electric elevators that have been installed in the administration building. These machines are to be in operation during the dedication ceremonies of the new buildings this month. In addition to this, the "C. & C." Electric Motor Company have also received orders for five more generators of 110 horse-power each, four of which are to furnish power to motors operated by exhibitors at the World's Fair and the fifth for furnishing lights.

PERSONAL.

Mr. F. E. Bailey is now the Philadelphia representative of the Harrisburg Foundry and Machine Works, manufacturers of the well known "Ide" and "Ideal" engines. His office is at 308 Builders' Exchange. Mr. Bailey will continue to operate the Dillsburg central station plant, which is loaded to its full capacity and is in a good paying condition.

Lieut. E. J. Spencer, who has charge of the Thomson-Houston plant at the World's Fair, will remove his office from the Lynn works to Chicago this week, so as to be at headquarters all the time. He will also remove his family from Lynn to Chicago. One of his assistant engineers will remain in Lynn until the end of the year, looking after apparatus for the Fair.

Charles D. Shain is Siemens & Halske's Eastern Agent.

Mr. Charles D. Shain, 136 Liberty street, New York, who has recently become the selling agent for several of the prominent electrical manufacturing companies, informs us that he has just closed with the Siemens & Halske Electric Company of America, for their entire business for the New England States, the Middle States, Virginia and West Virginia. He has also secured practically the same territory from the Sunbeam Incandescent Lamp Company, of Chicago. Mr. Shain is now selling agent for the Weston Electrical Instrument Company, the Carpenter Enamel Rheostat Company, the Siemens & Halske Electric Company of America, and the Sunbeam Incandescent Lamp Company.

"Ward" Ornamental Arc Lamps.

BEAUTIFUL AND ARTISTIC DESIGNS FOR INTERIOR WORK.

After the utilitarian value of a device has been demonstrated it usually happens that its development pursues an upward course until a near approach to artistic perfection has been reached.

Arc lighting is no exception to this statement. Its practical value is now unquestioned and of late the development of artistic arc lamps has closely approached the realms of æstheticism. The constant potential arc lamp offers the best opportunities for domestic development, its high tension brother having about the same relation to it as the Norman Percheron horse has to the Kentucky thoroughbred. The former plods along relentlessly at its work, while the latter looks pretty most of the time and is only occasionally called upon for a burst of speed.

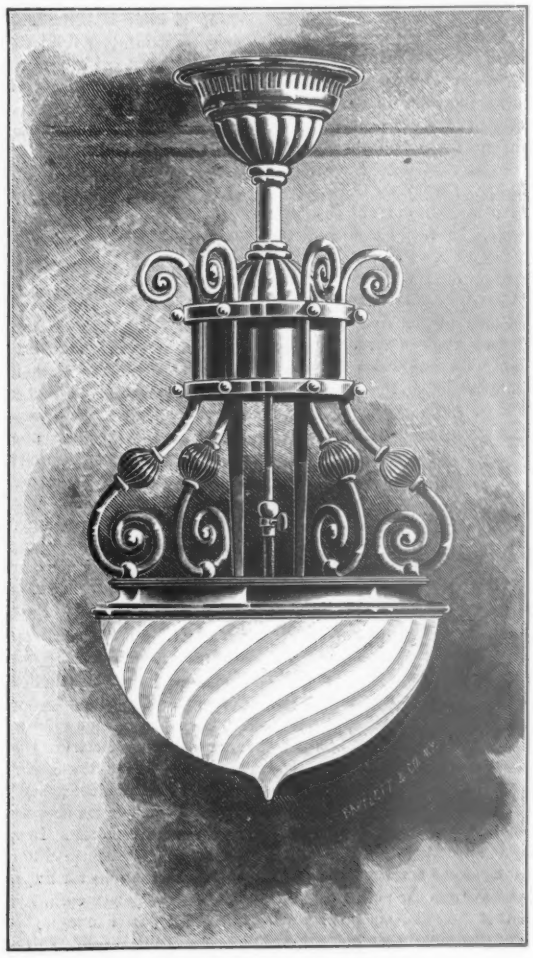


FIG. 1.—WARD ORNAMENTAL SHORT LAMP.

The Electric Construction & Supply Company, of 18 Cortlandt street, New York, are well known as the manufacturers of the "Ward" arc lamp for incandescent circuits. Mr. R. B. Corey, the general manager of the company, realized some time since that there was a demand for an ornamental arc lamp and accordingly set his forces to work to transform the "Ward" lamp into something beautiful. Engravings of four of these lamps are shown on this and the following page. Mr. Corey's company makes 40 styles of these lamps and executes special designs to order.

The "Ward" short lamp is illustrated in Fig. 1. It is surprising how many places require short lamps, and now that low ceilings seem to be coming into vogue again, the production of this lamp is unusually opportune. In the present instance we have a lamp that is perfectly safe for crowded dry goods basements on bargain days and that in a parlor would be much less conspicuous and cumbersome than the average chandelier or piano lamp. It is, in fact, hardly more bulky than a large incandescent, and a very slight change in its globe would enable any one to turn it into a fair counterfeit of the large incandescents that once made a strong bid for public patronage. The "Ward" short lamp will burn six and one-half hours, using a five-eighths inch carbon for the top and a seven-sixteenths inch solid carbon for the bottom. These lengths will burn out even. In all essential particulars the lamp is a regular standard "Ward" lamp, being built in the same sizes as to amperes passed, its special feature being its shortness and the use of a carbon of larger diameter to get greater length of run. The globes are so arranged for this style that they can either be held by tall rod or can be fastened at the top by bayonet joints.

Another style of "Ward" ornamental lamp, more adapted to loftier types of architecture, is shown as a "chain" lamp in Fig. 2. The chains are made to suit any height of ceiling and this design is extremely flexible in the decorative effects possible by its use. The "Byzantine" lamp, Fig. 3, is made almost entirely of spun and pressed brass, the intervening space between the fixture and the circlet on the globe being filled in with delicate chain, loosely hung, which, when touched by the rays of light, gives a most original and pleasing effect. The globe is secured at the top and the small opening at the bottom is covered by an ornament. The "coronal" lamp, shown in Fig. 4, is a handsome fitting, and can be built up and fitted with pieces to any desired length.

These lamps are made almost entirely from brass castings and their appearance is rich and imposing. The resistance required with each lamp can be placed in the canopies shown at the top of the illustrations, the wires being led down to the lamp mechanism through the fixture; or they can be suspended without the canopy and the resistance can be placed at any convenient location in the circuit.

These ornamental and artistic lamps are fixtures that will grace a mansion, add dignity to a fine hall, supplement the rich architecture of a church, relieve the plainness of a busy store, give airiness and charm to a railway depot, embellish the entrance to a hotel and brighten the approaches of a theatre.

Tesla's Experiments.

MR. STEINMETZ ON THE EFFECT OF THE ALTERNATING CURRENT UPON THE HUMAN BODY.

Mr. Chas. P. Steinmetz, one of the ablest modern electricians, has, as is well known, taken a lively interest in Mr. Tesla's now famous experiments with high tension currents. Lately Mr. Steinmetz has taken up the question in a letter addressed to the *Electrotechnischer Zeitung* September 16, 1892, and, as this matter is of considerable importance to all electricians, we give a translation of Mr. Steinmetz's letter, to which we invite Mr. Tesla's attention. We shall be pleased to hear from him in reply:

Suppose the engine develops 10 horsepower, then the dynamo cannot produce more than a 500 volt 10 ampere current. Upon transforming this current up to 70,000 volts, with a 50 per cent. efficiency (and this is far in excess of the real efficiency), we find a current of one-thirtieth of an ampere in the secondary circuit. Again, assuming the resistance of the human body to be 2,000 ohms, this current does not exceed two and one-quarter watts, and produces, therefore, a scarcely appreciable effect upon the human system. But the apparatus used for electrocution developed 1,500 volts, with a current strength of three amperes, measured from hand to hand, or 4,500 watts; in other words, the real effective power was 2,000 times greater than that developed upon touching the so-called 70,000 volt current.

But even 4,500 watts produced no instantaneous death, and it was found necessary to send the current from the head of the criminal to his leg. The meters then showed seven amperes and 1,500 volts, or 10,000 watts. Result, instantaneous death.

From the above, it is evident that excessively high tension currents are harmless without the necessary amperage. A little computation shows that had there been 70,000 volts tension between the hands of the experimenter, a current of 140 amperes would have passed, *i. e.*, 10,000,000 watts, and such a current would have produced the same effect as a lightning stroke, *i. e.*, immediate disintegration of the body.

In volume 32 of the *Electrotechnischer Zeitung* I find a paper by Mr. Korthals which explains, or rather attempts to explain, the freedom from danger to the human system subjected to a 70,000 volt tension in Mr. Tesla's experiment by the capacity of the human body.

This view is overthrown by Mr. Tesla's own statement which shows that such immunity from danger only exists with a certain adjustment of the condenser in the primary circuit. As soon as this adjustment is changed the spark loses its peculiar, characteristic color, and is no longer harmless.

Again, assuming that Mr. Korthal's explanation be true, the oscillating discharge of a Leyden jar of a much higher periodicity should not affect the human system.

To my mind, however, the reason of this immunity from danger is a much simpler one. In other words, the assertion that the human body was exposed to a tension of 70,000 volts in Mr. Tesla's experiments is nothing but a chimera. I had the pleasure to be present at one of the first lectures of Mr. Tesla. The experimenter included himself in the secondary circuit of the induction coil in series with an air space of several feet. But, as the resistance of the human body is infinitely small, compared to the resistance of an air space of several feet, the experimenter received only an infinitesimal portion of the 70,000 volts. Upon touching, however, the binding posts of the secondary coil, the high tension no longer existed, the circuit being practically short circuited through the human body. The same phenomenon may be observed with any spark coil.

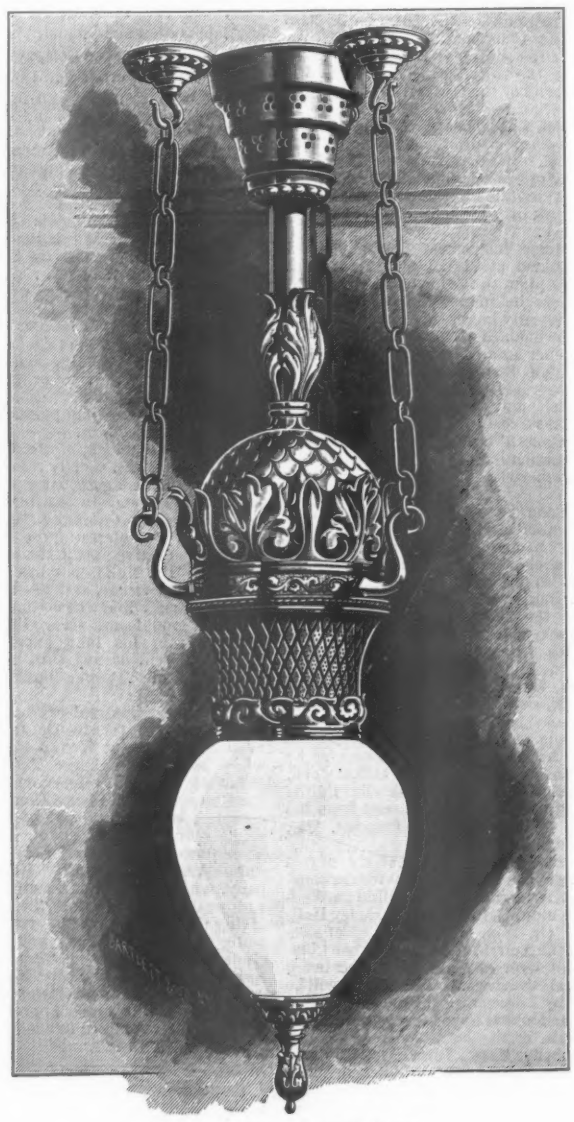


FIG. 2.—WARD "CHAIN" LAMP.

The mistake in Mr. Tesla's conclusion consists in comparing the conditions of this experiment with such as prevail when we touch an ordinary alternating current circuit of constant tension. On the contrary in Tesla's experiment the tension is not constant, but depends directly upon the resistance through which the circuit is closed. In other words, the entire experiment is analogous to the work of a frictional machine. There we easily produce a tension of 100,000 volts, yet sparks drawn directly from the collector are scarcely felt. In my own experience, I have obtained sparks at a

distance of two feet from the driving belt of a dynamo machine, which sparks represented a tremendously high electrical tension, nevertheless, I did not feel any effect whatsoever. Under such conditions the actual current passing through the body is infinitesimal and of low tension, while the electrical tension outside the body is consumed in the spark. It is evident that the periodicity is of no consequence as far as this phenomenon is concerned; it only has to be accounted for because the self-induction of the circuit depends upon the rate of change.

Now, a Tesla dynamo has an exceedingly high self-induction besides that of the induction coil, and the added effect of these two factors produces a high degree of self-regulation for continuous currents in the primary circuit, so that the current, the same as in a Westinghouse arc light dynamo, cannot exceed a definite maximum value.

LITERARY.

A copy of the Australasian edition of the *Inventive Age* has been received, with which is incorporated the Australasian edition of *Discovery*. It is a handsomely printed 16-page journal, discussing in an entertaining way a large variety of subjects interesting to inventors. It keeps in touch with the progress of invention in the United States, which should commend it favorably to Australians; it also supplies them with domestic news in the interesting field it covers.

The October number of *Scribner's Magazine* begins a group of articles on "The World's Fair at Chicago," with a picturesque description by H. C. Bunner, of "The Making of the White City." Mr. Bunner looks with appreciation and surprise on the wonderful transformation which a year has made in the waste and desolate sandy plain which has now become the "site of such a group of buildings as has never before been assembled for such a purpose, on such a scale, within such a time and in such conditions." A series of illustrations by W. T. Smedley illustrates this striking transformation.

ELECTRIC ILLUMINATION AT WASHINGTON.

(*Continued from First Page.*)

Above each corps badge, the name of some notable fight in which the corps took conspicuous part or well-remembered sojourning place during the war, was writ in electric lamps. At rarer intervals the portraits in oil of the leading war generals were suspended, each surrounded by a double border, the inner one of very small lamps, the outer of lamps of a larger size and higher candle-power.

At the corner of Tenth street, in front of the Washington *Post*, was erected a splendid anchor, about 20 feet high. When lighted it blazed so brilliantly as to make it the most attractive set piece on the avenue. In front of the Washington *Star*, twin stars of red and blue were placed, and a patriotic device gleamed from within the office windows.

At the head of the avenue at the entrance to the White Lot was erected the most conspicuous design of the occasion. It was a monster *fac-simile* of the G. A. R. badge, 18 feet high, entirely made up of incandescent lamps. The eagle was outlined in white lamps, the cannon in blue, the stars and stripes in the regulation colors, and the pendant star in amber lamps. This piece was duplicated at the corner of Seventeenth street, below the White House. From the children's stand, at the head of the avenue, the name of Lincoln, in white lights, evoked pathetic reminiscences from the veterans.

The illumination of the Treasury Building presented considerable difficulty. This was overcome by arranging along the cornice at the top of the fluted columns, a line of arc lamps, which stretched from the entrance to the White Lot almost entirely around the building. The red, white and blue globes of the lamps lent themselves admirably to the colors of the flags with which the building was hung. Colored arc lights were also used to illuminate the camp on the White Lot.

On the White House lawn, in front of the Mansion, a most fairy-like effect was produced. Every bush, tree, fern and flower bed glistened with the light of innumerable miniature lamps, so suspended as to conceal all the mere practical details of installation. No less than ten revolving stars, each of different design, were also set up here, and, constantly changing in design and color, reappearing and disappearing, obtained a well-merited meed of success.

Over each entrance to the mansion was set a star of deep blue lamps.

A marvelous effect, and one never yet essayed to add to the brilliancy of an illumination, was obtained by the introduction of the search-light. On the roof of the Washington Loan and Trust Company's building were set four 24 inch General Electric Company's projectors, built at Middletown, three facing the Capitol and one facing the Monument. During the evening the brilliant rays of light from these projectors shot the National colors on the clouds or illuminated the surroundings of the city. The most marvelous effects were obtained, however, when the whole four were brought to bear on the Capitol or on the monument. The nights being without moonlight, the background was absolutely black, and when the lights were thrown on the Capitol it appeared as the magnificent white marble building it really is, but grandiose and awe-inspiring beyond conception, and many a veteran bears away with him an aspect of the Capitol which will live in his memory while he himself lives. The illuminated monument was none the less effective. The white stone shaft springing up straight into the blackness of night seemed like a supernatural finger pointing heavenward.

All this remarkable display was not obtained without great effort. Less than 30 days elapsed between the commencement of the work and the illumination. Poles had to be erected and a whole three wire system installed, drawing current from every available dynamo, public or private, in the city. In fact, not enough current could be procured.

Two G. A. R. badges, 63 corps badges, the same number of mottoes and names, special devices, such as the anchor and stars, had to be designed and executed. The streets had to be skillfully wired and sockeeted, the revolving wheels to be conceived and constructed. Projectors had to be brought from the factory and erected. It was a great undertaking brought to a satisfactory termination. Some idea of the work can be gained from the fact that over 25,000 incandescent lamps were used in the illumination, as well as over 100 arc lamps.

Credit for the success of the illumination is to be rendered to Mr. A. D. Page, to whom *carte blanche* had been given, and to Mr. F. H. Clarke, the Washington representative, who were materially assisted by Mr. Fanshawe and Mr. McAllister, both skillful designers and versed in lamp requirements. The search lights were in charge of Mr. Gragg.

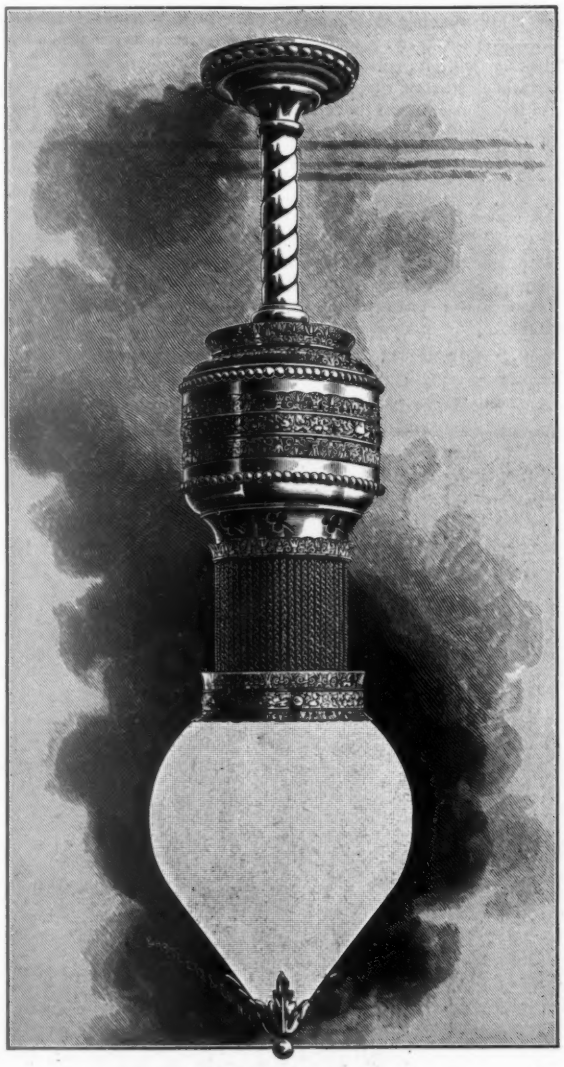


FIG. 3—WARD "BYZANTINE" LAMP.

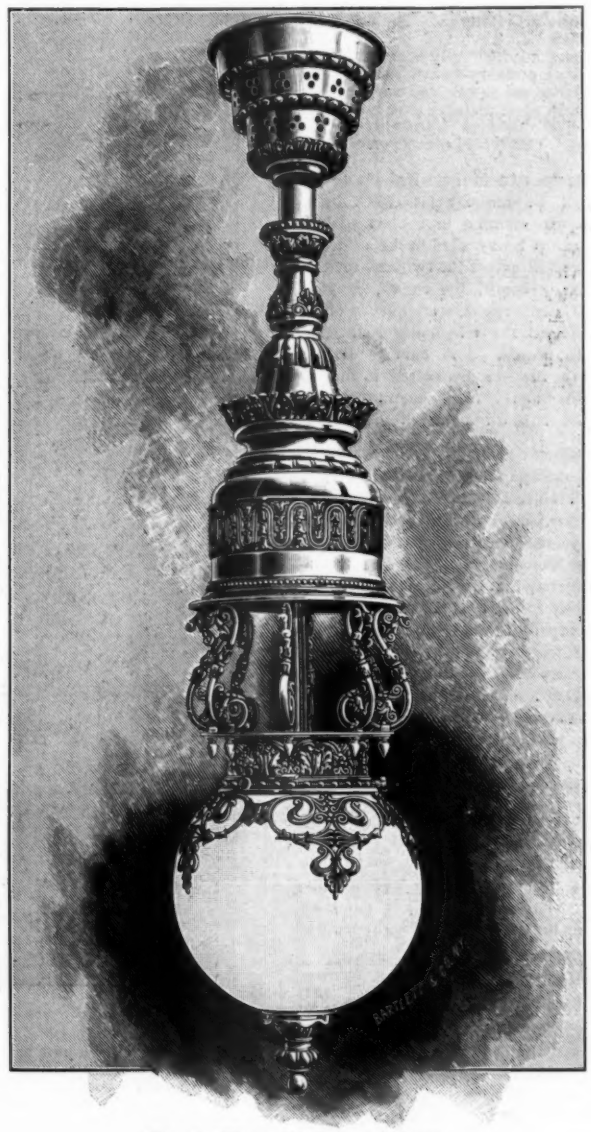


FIG. 4—WARD "CORONAL" LAMP.

By a transfer of stock in the Palmer, Mass., Electric Company to A. M. Young, of Waterbury, Conn., a new company has been formed and will be known as the Palmer and Monson Electric Company. The officers of the company are as follows: President, George C. Flynt, of Monson; directors, A. M. Young, George C. Flynt, W. W. Leach, C. B. Fiske and C. E. Fish. The company has purchased the water power located at Blanchardville, and will proceed at once to build a new dam and move the plant now located in town to the new site, and by doubling the capacity will furnish power for lighting the villages of Monson and Palmer.

TELEPHONE CHAT.

New Bremen, O., wants telephonic connection with St. Marys.

Malvern, Ark., will soon be connected by telephone with Hot Springs and Little Rock.

The Northern Telephone Company is building a line from Tyson to Ludlow, to connect with the Rutland, Vt., circuit.

Telephonic communication in Tunis is available between the city of that name, the suburbs of Goletta and Ularsa, and also the Port of Susa.

The Hudson River Telephone Company has added 25 drops to its Middletown, N. Y., office, the same being rendered necessary by the removal of the Goshen central office.

The Sunset Telephone Company is arranging for the erection of a telephone line to Renton, Newcastle, Gilman, Wash., and other mining towns in that neighborhood. A central office will be established in each town.

A press dispatch from South Bend, Ind., dated September 28, says:

The American Long Distance Telephone Company, which has been constructing a line from New York to Chicago, working from both terminals, this forenoon virtually completed the line to this city and will tomorrow finish it to Chicago. The line from here to New York worked perfectly. A whisper here was distinctly heard at Pittsburgh, and an ordinary tone of voice at New York. Later in the day Boston was reached, making the longest distance over which the human voice was ever transmitted—over 1,000 miles. This test also was perfect.

A fire was caused in the telephone tower at Utica, N. Y., one day last week by a telephone wire coming in contact with a trolley wire. A heavy wind broke a "dead" wire, which fell across the two and made a circuit. As a result, the cables, carrying about 1,100 connections, were burned off or broken, and all the telephones in the city were disconnected. The damage is not large, as the fire was discovered in time to prevent the flames from communicating with the switchboard or the building.

A hearing was given by the Lynn, Mass., board of alderman last week to the New England Telephone and Telegraph Company, who wish to institute their underground system in Lynn. Mr. Powers appeared for the company, and said he objected to Section 9 of the ordinance, which gives the city free use of the conduits. He said his company would build conduits for the use of the city and take care of them. The company has expended for the city of Boston $50,000, and other companies could say they had done as much. He said he was authorized to state that his company would give the city one free telephone for every four telephones used in the city.

The American Bell Telephone Company makes a favorable showing of its instrument account for the month ended September 20, the net output being 2,648 for the month, an increase of 737. The comparative exhibit for the month and eight months follows:

Month Sept. 20.	1892.	1891.	Increase.
Shipments.....	7,166	5,552	1,614
Returned	4,518	3,641	877
Net output...	2,648	1,911	737
Since Dec. 20.	1891-92.	1890-91.	
Shipments.....	72,385	53,318	19,067
Returned	42,000	31,349	10,651
Net output...	30,385	21,969	8,416
Instruments in use September 20..	541,495	503,695	37,800

Electric Cake.

We have received from Mr. D. C. Dewar, assistant manager of the Bell Telephone Company, Ottawa, Ont., a little sponge cake cooked by electricity. It was baked at the Central Canada Fair by Mr. R. E. Jamieson, an Ottawa baker, in an electric oven invented by Mr. Ahearn, of Ottawa, said to be the only one in the world. From the antics of the office cat, we judge the cake to be of good quality and uncontaminated by the electric current.

TELEGRAPH NEWS.

George E. Clark has resigned his position as manager of the Postal Telegraph Company at Colorado Springs, Colo. He will be succeeded by W. L. McCall, of Des Moines, Iowa.

The Minneapolis council committee on underground wires has granted the Commercial Telegraph and Electric Company the privilege of laying their telegraph and telephone wires in the Dorsett conduits, which were laid some time ago.

Conservative telegraph operators express the belief that there will be no serious trouble between the operators and their employers in adjusting the differences that exist. The operators really made no demand for increased compensation, but asked that an equalization of wages and hours of duty be made. The railroads interested will likely do this, as it will not increase their expenditures any way, and, therefore, a strike is not among the probabilities. General Manager Smith, of the Missouri Pacific, says that the operators on that line are now paid the best salaries of any railroad telegraphers in the country.—*St. Louis Star Sayings.*

The Indiana Natural Gas and Oil Company have just completed another stroke of enterprise which again demonstrates the fact that this organization never does anything by halves. It is not another pipe line or pumping station, but a private telegraph line from their Greentown offices and their headquarters in Chicago. They leased a Western Union wire from Chicago to this city and have just constructed a new line from Kokomo to the pumping station. They will employ their own operators, and the whole line will be entirely under their control. The office in this city will be ready for business in a few days.—*Kokomo, Ind., Dispatch.*

Beginning October 1 a new method of counting the words in a message was instituted by the Western Union Telegraph Company. All dictionary words, surnames of persons, initial letters, names of cities, States and Territories, will be counted and charged each as one word. Figures, letters, commas and bars of division or any combination thereof will be counted, each group being taken separately, three letters, figures or signs to the word, and any group containing less than three letters will be counted as one word. Managers of the company claim that the new mode of counting will be advantageous to business men, and that it will materially lessen their telegraph tolls.

Siemens & Halske Electric Machinery.

Killingworth Hedges, in the preface to his very valuable recent work, "Continental Electric Light Central Stations," states: "After visiting the Frankfort Electrical Exhibition, the greatest sceptic ought to have been convinced that however forward the art of electric lighting may be here, our foreign neighbors are quite up to date," and quoting the words of Professor Forbes, "That to ensure the best success of electric lighting schemes now on hand, we should bury our pride a little and try to obtain the experience of foreign countries."

Siemens & Halske, recognizing the fact that large dynamos coupled directly to the steam engine shaft, running at comparatively low rates of speed, thereby saving the expense of belting, with its corresponding loss of power through friction, slipping, etc., were bound to be the machines of the future, turned their attention to the designing and construction of such machines, and have gone from 500 horse-power to 1,000 horse-power, thence to 1,500 horse-power, and now to 2,000 horse power, a size about three times as large as built so far in this country. The wisdom of building large dynamos was questioned by many electrical engineers, and many arguments pro and con resulted.

Silvanus P. Thompson, in his recent work, "Dynamos and Electric Machinery," states that he has been of the opinion for years past that large dynamos are preferable, not because he has any admiration for mere bigness, but because, as in steam engines, so in dynamos, the large machines may be made more efficient than the small in proportion to their cost.

Kapp's estimate was:

Diameter armature.....	10	15
Revolutions per minute.....	1,000	670
Number of glow lamps.....	150	620
Price.....	$500	$1,380
Electrical efficiency.....	80	89

showing four times the electrical output for a little more than twice the cost.

The mechanical, electrical and financial results achieved by the Siemens & Halske large dynamos fully warrant the belief of those who advocate such large machines.

The accompanying illustration shows one of the 1,000 horse-power alternating machines coupled direct to a 1,000 horse-power Collman engine. This machine develops 700,000 watts, 2,000 volts and 350 amperes. This machine has 60 poles. The armature is stationary. The field magnet ring consists of 60 bobbins, rotating inside the armature, which has the same number of coils. The outside diameter of the rotating field magnets, 12.2 feet; the armature, 15.1; number of revolutions, 100 per minute, so that it has 6,000 changes per minute in the poles.

The field magnets are excited by a direct current, which is brought from an exciter machine. Every coil is insulated with hard rubber from all metallic connections, and the stationary armature, such as is used in this type of machine, enables the maker to provide much better insulation than when the armature itself revolves.

The other illustration shows the direct current dynamo. It is of the inside pole ring type, which class has from four to twelve poles. They are placed in the form of a star inside the rotating armature. The brushes, which are always of the same number as the field magnets, take off the current from the outside of the armature winding.

The armature itself consists of an iron ring wound with copper segments. The special machine herewith illustrated has ten poles and is designed for an output of 746,000 watts. This machine can be built without special commutator from 100 to 700 volts, and can be used for lighting and

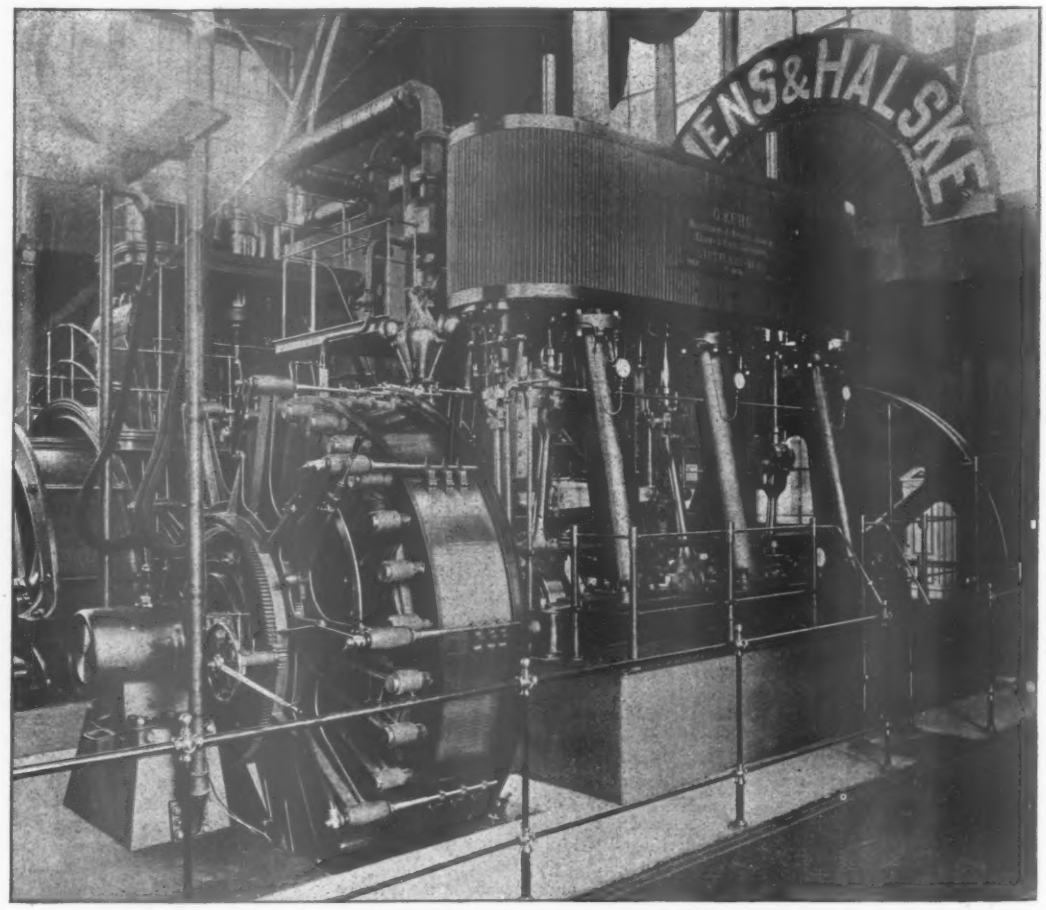


FIG. 1.—SIEMENS & HALSKE ELECTRIC MACHINERY.

power. The loss of tension in the armature is only two per cent. with maximum load. For exciting the field magnets only one and one-half per cent. is required. Therefore, the electrical efficiency of this machine is about 96½ per cent. It is shunt wound and has a surface velocity of 50 feet per second.

The works of the Siemens & Halske Electric Company of America are located in Chicago. They receive all drawings from Berlin and will duplicate the construction that has resulted from the vast experience gained by Siemens and Halske during the half century of their existence.

The town of Salem, Va., has bought for $19,000 the Salem electric plant, franchise, etc. The plant cost $30,000 one year ago.

The Consumer's Electric Light and Street Railway Company is a new one just organized in this city. Let them come, "the more the merrier."—*Tampa, Fla., Tribune.*

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

McKEESPORT, PA.—Another street railway company, backed by Pittsburgh capitalists and H. H. Sweeney, of McKeesport, has received right of way from Dravosburg to Coal Valley, and will at once put down a single track electric line.

TOLEDO, O.—The Toledo Electric Street Railway Company has been granted permission to extend its tracks.

MERIDEN, CONN.—John W. Coe, who has bought a controlling interest in the Meriden street railway, has promised to build a new electric extension to Wallingford and Yalesville.

HAMMOND, IND.—The Whiting, Hammond and East Chicago Street Railway Company; capital, $100,000. Incorporators, C. F. Griffin, A. Bloch, M. Joel and A. R. Shroyer.

CAMDEN, N. J.—The North Shore Traction Company; capital, $6,000,000. Incorporators, Edward E. Denniston, John P. Isle and C. Ford Stevens, all of Philadelphia; A. Haas, of Chester, and John McNeill, of Haddonfield. The object of the company is the operation of a passenger railway with electric motors and cables in the counties of Essex and Middlesex, Massachusetts. The underground trolley system will be used.

JERSEY CITY, N. J.—The Jersey City and Bergen Railroad Company proposes to adopt electricity as a motive power on its belt line.

CHICAGO, ILL.—The Jefferson Street Railway Company; capital, $500,000. Incorporators, Geo. N. Parker and Joseph R. Bickerdike.

CHICAGO, ILL.—The Calumet Highlands Street Railway Company; capital, $1,000,000. Incorporators, L. H. Roach, John Keene and H. W. Cromwell.

CHICAGO, ILL.—The Chicago Traction Company; capital, $1,000,000. Incorporators, Chas. Vogel, Chas. Vogel, Jr., and Thomas O'Brien.

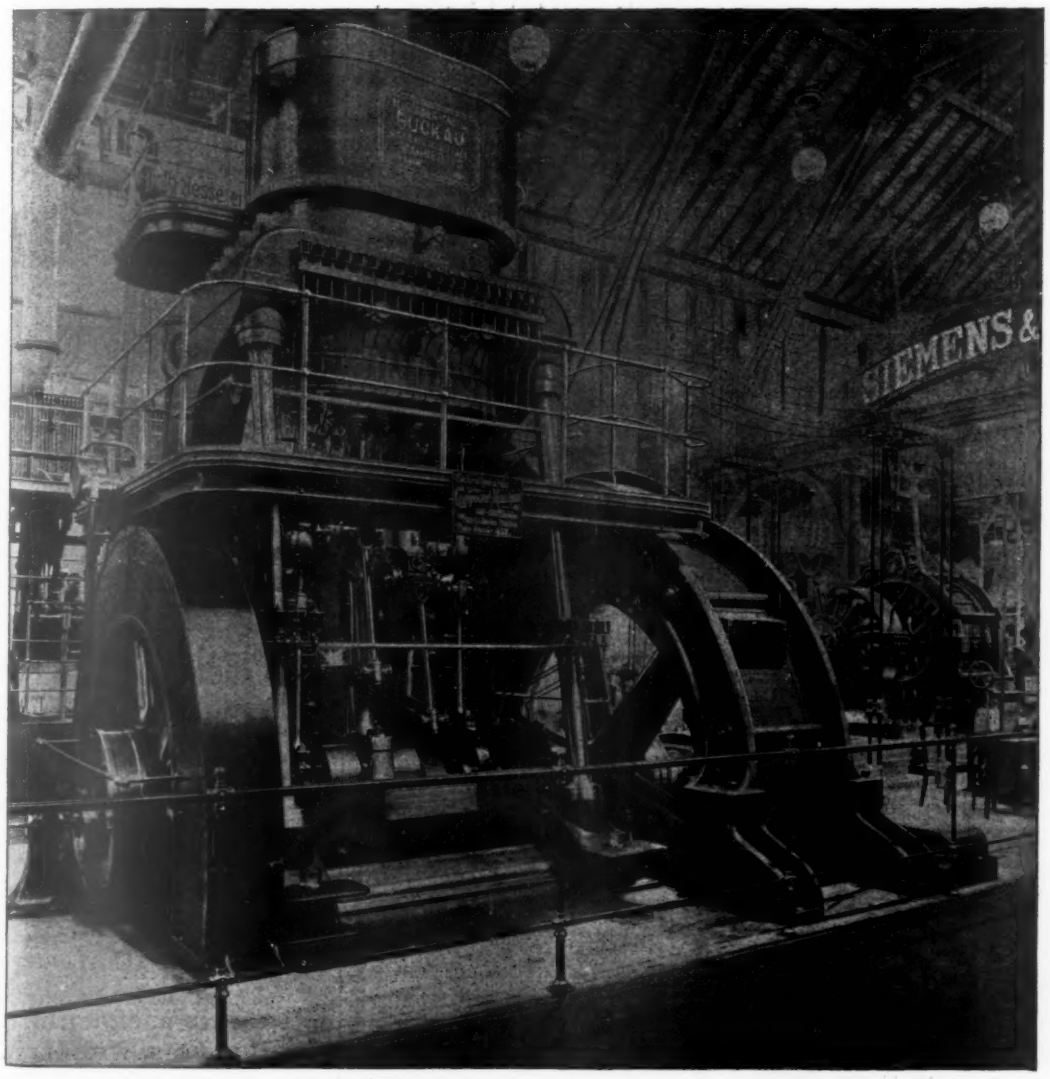


FIG. 2—SIEMENS & HALSKE ELECTRIC MACHINERY.

READING, PA.—Ordinances are pending in council to permit all the street car lines in Reading to use the trolley system.

NEW YORK CITY.—The Belden Point Railroad Company has been incorporated with a capital stock of $30,000, to construct a railway, to be operated by electricity or steam, from the line of the New Haven road in Westchester county to City Island. The directors are John G. Hyatt, P. D. Sturgis, V. Smith and James English, all of New York city, and William Belden, of City Island,

OAKLAND, CAL.—The Oakland Consolidated Street Railway Company has applied for a 50-year franchise to build a new electric railway.

DETROIT, MICH.—The Detroit Citizens' Street Railway Company has discarded the Healey motor on the Baldwin avenue line, and will make it a trolley road.

FREMONT, COLO.—The Cripple Creek Street Railway Company; capital, $100,000, has been organized to build an electric line to Cripple Creek and the intermediate towns. Directors, Geo. Jordan, A. C. Hickman and others.

MEDFORD, MASS. — The Middlesex Falls Electric Railroad Company has been granted a franchise.

LAREDO, TEX.—The Laredo Electric and Railway Company; capital, $100,000. Incorporators, Carl F. Drake, of Austin; B. M. Hammond, of San Antonio; Chas. L. Yeager and E. S. Harris, of Laredo.

PITTSBURGH, PA.—The Morningside Electric Railway Company, recently incorporated, is an applicant to council for permission to build an electric railway five and one-half miles long.

SACRAMENTO, CAL.—The Folsom Water Power Company has petitioned the city trustees for a franchise to build a street railway here.

NANTICOKE, PA —The Peoples' Street Railway Company, capital, $60,000, has been chartered to build an electric railway, 10 miles in length, from Nanticoke to Wanamie and Glen Lyon. Directors, K. M. Smith, of Alden, Pa.; Geo. T. Morgan, Wm. Fairchild and B. Jackson.

POTTSTOWN, PA.—The Citizens' Passenger Railway Company; capital, $75,000. Directors, John P. Dunn, John A. Weber, of Pottstown; W. W. Carr, of Philadelphia and James C. Herlig, of Reading.

Electric Light and Power.

MONTGOMERY, ALA.—The Mutual Light and Power Company, W. F. Vandiver, president, will erect a new power house.

ST. PAUL, MINN.—The National Subway Company, the St. Paul Telephone Company and the St. Paul City Railway Company have been granted authority to lay their wires underground.

RIDGEWOOD, N. J.—L. N. Tafft and others propose the erection here of an electric plant of sufficient power to light this village.

CLAY CENTER, KAN.—The electric light plant owned by H. F. Dexter was burned September 17.

WARREN CITY, O.—The Warren Water, Light and Power Company; capital, $100,000. Incorporators, Charles C. Pomeroy, Charles E. Kimball and W. J. Curtis. The company will supply electric light and power to Warren City and Summit.

ELMWOOD, ILL.—The Elmwood Electric Light Company; capital, $30,000. Incorporators, Edwin R. Brown, Laura S. Brown and E. L. Brown.

LEE, MASS.—The Lee Electric Light Company has decided to move its plant from East Lee to Lee, where it will erect a new station.

ALLEGAN, MICH.—The Allegan Electric Light and Power Company; capital, $40,000.

HAMPSHIRE, ILL.—The Warner Lock Company has been granted exclusive right for 30 years to construct and operate an electric light and power plant.

LOGANSPORT, IND.—The city is considering the question of establishing a municipal electric light plant.

PROSSER FALLS, WASH. — Prosser Falls Land Company; capital, $100,000. Promoters, C. J. Smith and Jno. Collins, Seattle, Wash.; A. K. Hiscock, Frank Allyn and H. H. Greeley, of Tacoma, and Fred. R. Reed, of North Yakima, Wash.

LAREDO, TEX.—The Laredo Electric and Railway Company; capital, $100,000. Promoters, Carl F. Drake, Austin, Tex.; Ben. M. Hammond, San Antonio; Chas. F. Yeager and E. S. Harris, Laredo, Tex.

TRENTON, N. J.—Trenton Light and Power Company; capital, $760,000. Promoters, J. Moses and S. D. Green, of New York; F. A. Magewan, W. B. Allen, S. D. W. Vroom and S. K. Wilson, Trenton, N. J.

BARBERTON, O.—The Barberton Electric Company; capital, $40,000. Promoters, F. H. Bostwick, B. F. Tracy, Edward A. Helene, Edward S. Waters, H. A. Robinson.

SUMMIT, N. J.—Warren Water, Light and Power Company; capital, $100,000. Promoters, C. C. Pomeroy, New York; C. E. Kimball, W. J. Curtis, of Summit. N. J. Incorporation papers sent to Sullivan & Cromwell, 45 Wall street, New York.

SAN BERNARDINO, CAL.—San Bernardino Electric Company; capital, $50,000. Promoters, Peter Kehl, W. R. Porter and W. E. Van Slyke, San Bernardino, Cal.; F. G. Curtwright and C. R. Lloyd, of San Francisco. Incorporation papers sent to Wm. Gird, San Bernardino, Cal.

GRASS VALLEY, CAL.—Nevada County Electric Power Company; capital, $500,000. Promoters, Alphonso A. Tregidgo, Hulbert H. Clark, John H. Moss, Eugene J. C. Sahler, Jr., and Fred. Searles.

MINNEAPOLIS, MINN.—Minneapolis General Electric Company; capital, $2,500,000. Promoters, E. S. Corser, A. B. Burton, A. Kelly, C. H. Prior, A. M. Robertson, J. W. Griffin.

DAWSON, PA.—Dawson Electric Light and Power Company; capital, $20,000. Promoters, Philip S. Cochran, Jno. S. Newmyer, Bert Neville.

PUNXSUTAWNEY, PA.—The Jefferson Electric Light and Power Company; capital, $6,000. Promoters, S. E. Wilson, J. C. Myers, M. J. Dinsman.

NUNDA, N. Y.—D. S. Robinson, president of the village trustees, has been authorized to examine the electric light plants of other cities preparatory to erecting a plant at this place.

KINDRED INTERESTS

The Pacific Telephone and Telegraph Company have sent us a copy of their telephone directory of San Francisco subscribers and local connections for August. It is systematically indexed and evidences considerable care in its preparation.

The McGuire Manufacturing Company, Chicago, sends us a handsomely illustrated pamphlet describing their patented trucks for electric, cable and elevated railway cars. The McGuire trucks have established an enviable reputation for themselves.

The Ball Engine Company, Erie, Pa., is sending out an illustrated catalogue describing their latest improved heavy duty engines for electric railways. Accompanying the catalogue is a tastefully prepared brochure entitled, "Electric Lights on a Coral Reef," describing an electric light plant at Key West, Fla., for which Ball engines furnish the power.

The Berlin Iron Bridge Company, of East Berlin, Conn., are building a new machine shop for the Mather Electric Company, at Manchester, Conn. The building is 52 feet wide by 150 feet long, the central portion being 35 feet wide and controlled by a 15 ton traveling crane. The design is a combination of iron and wood—all the heavier parts of the building being of iron.

The Bryant Electric Company has had plans made by Architect H. A. Lambert for a large factory to be built adjoining the present plant, corner of State and Ogden streets, Bridgeport, Conn. The new building is to be 40 feet front by 128 deep, and will have three stories and a basement. It will be of wood, mill construction, and will be equipped with new boilers and engine, elevator, etc.

Babcock & Wilcox, the widely known boiler manufacturers, find a great demand for their interesting work, entitled, "Steam." It should be in the possession of every engineer. The book is not an ordinary catalogue or advertising pamphlet, but contains a great deal of every-day practical information. Any of our readers desiring this book will receive a copy free by writing to the company's office at 30 Cortlandt street, New York city.

A Compliment for "K. K." Wire.

Messrs. Holmes, Booth & Haydens are in receipt of many words of praise for the excellence of their K. K. line wire. Among many of these the following is published and is an extract from a letter by the treasurer of the Bristol, Pa., Electric Light and Power Company:

"All our K. K. lines withstood the storm of Saturday night. In two instances telephone wires rested across the mains without short-circuiting us, and a number of such wires depended from our lines to the ground without showing any ground at the station.

In fact, we have never had a break or ground on your wire, and hope that we never may. Yours very truly,

CHAS. E. SCOTT, Treas.

Bristol, Pa.

SPECIAL CLUB RATE.

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